THE

Practical Teacher

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'*Knowledge is proud that he has learned so much,*
Wisdom is humble that he knows no more.'—COWPER.

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School Surgery.

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IV.

WOUNDS—(*continued*).

IF there is a suspicion that a particular wound is a poisoned wound, the possibility of damage from it may be diminished by suction. No danger results to the person himself who applies this kind of treatment. When the wound is caused by the bite of a dog or other animal, or by the sting of a snake, the free application of saliva is useful; perhaps it is the most useful application which can be put into the wound. It is comparatively useless to cauterise such a wound in the way in which it is ordinarily effected. It is often done even the day after the wound has been inflicted, but it cannot overtake the consequences produced by the offending matter. The effects of such a wound are best met by using constitutional remedies, such as the surgeon may direct. The bite of a dog is comparatively of very little consequence if the animal is not mad: probably not one in a thousand of the bites which are made by dogs in every-day life are followed by evil consequences. Most of them are produced by the animals in play. A boy finds his hand in the dog's mouth, and, withdrawing it hastily and almost instinctively, he tears his flesh by contact with the sharp teeth of the animal. No evil will be likely to follow from this accident if the boy is in good health. If the wound is seen immediately, and if there is any doubt on the point as to rabies, a solution of caustic may be applied to it; or, better still, a little nitric acid may be put on after freely sucking the wound with the lips and moistening it with saliva. If the dog is really rabid, the strong nitric acid should be applied at once to the wound, so as to destroy the whole of the bitten part; but this must be done by a surgeon, and, until the skilled practitioner arrives on the scene, suction, and then the application of some simple matter such as carbolised oil, will be all that should be attempted by an unskilled hand. Bites made by cats, horses, and other animals are occasionally very disagreeable, but to all these carbolised oil is the best application after cleansing the bitten part with warm water, and sucking the wound. If the constitution of the child is healthy, there will be nothing but local irritation set up.

The consequences of hydrophobia are, in reality, very frightful, and as a sequence to the fright produced by the bite of a dog the frequency with which mischief results is magnified. Cases are fanned into activity by the mental anxiety of the bitten person, assisted by the anxious inquiries of the friends. It is very important, as regards its effect upon the bitten person, that no inquiries should be addressed to him as to the bite or his feelings regarding it. If he can forget it, so much the better—his nervous system will not be made more sensitive or more ready to take on the nervous action, which assists to fan the disease into activity.

If a boy has been bitten by a dog which is supposed to be mad, no reference should ever be made to it by the masters; and, if possible, his schoolfellows should be cautioned against talking to him about it. If there be a minute dose only of the poison inserted in the flesh of the boy, it may be dwarfed, and it may abort instead of being fed by the morbid matter which nervous alarm itself produces, and which is the result of nerve disturbance in the boy's mind reflected upon his body. This is probably the pabulum upon which the poison feeds. It seems to be established pathologically that there is a very rapid extension of effect along the nerves from the parts injured to the spinal cord. This extension takes place during the incubative stage. The disease then affects the spinal and the sympathetic nervous system, and through them the emotional nerves in a manner which, from the effects produced, is known by the name of hydrophobia. Let me repeat that not one in a thousand of those bitten by dogs run any risk of being a victim to this terrible complaint, and probably not one in ten who have been actually bitten by a mad dog do get the disease in question. A large number of those who suffer from it have a morbid dread of it, which has been sometimes produced by the mistaken anxiety of the companions and friends of the bitten persons. If it is certain that the dog which has inflicted the wound is mad, it is right to pour some nitric acid freely into the wound, if it can be done at once, as the acid finds its way into the deepest part of the injured flesh. The application of lunar caustic is not so likely to be as

BRITISH MUSEUM

effectual, because it may not get into the deepest part of the wound itself, and then the morbid matter is not entirely destroyed. Nitric acid is sometimes better known by the name of aqua fortis. It is a powerful corrosive, and destroys every part of the skin or other tissue with which it comes into contact. It must be judiciously used. To avoid injuring another part, which ought not to be touched by the acid, we may apply a coating of sweet-oil. The oil will limit the immediate effect of the acid and prevent it from producing unnecessary injury. It would be highly imprudent to apply nitric acid in the neighbourhood of the eyes, if the wounds are upon the face, except under medical advice. It is, fortunately, very unusual for bites of rabid animals to occupy that position, the hands, arms, and calves of the legs being the parts most usually attacked, and to those nitric acid may be applied without much danger. The best way to use it is to make an extemporaneous brush by means of a wax lighter or wax lucifer match. Light the taper, let it burn a few seconds, blow out the flame, and fray out the wick into a brush form. Plunge the newly made brush into the acid and brush over the bitten flesh, letting some of the acid drop into the deepest part of the wound. The acid does not destroy the brush itself. If a medical man is at hand he will probably incise the wound so that the acid may certainly get to the bottom of it, but a knife used for such a purpose in the hands of the unskilled operator will probably be as dangerous to the victim as the bite itself. It is not therefore, to be done except *secundum artem*. The parts so treated should be covered up with carbolised oil, and preserved from further injury by keeping it perfectly quiet. More mischief is done sometimes by using the damaged part too much after an injury, than that which results from the injury itself. The application of the acid leads to the destruction of the whole of the part which is in contact with it. This destroyed part has to be removed by a kind of exfoliation, and whilst it is undergoing the process of removal, the neighbouring tissue is actively at work to repair the damage which has resulted. The destroyed part must be kept from putrificative action. Carbolised oil will effect this object, and with perfect cleanliness and quiet, will be all that will be necessary to allow the wound to heal rapidly, provided the child is in a healthy state. If he has not been excessive in the use of flesh as a food; if that flesh has been of a healthy and proper kind, and he has not been accustomed to stimulants, no evil will be likely to arise; but those children who are overfed, and who are allowed to take stimulants, run the risk of mischief from which their fellows are free. Abscesses form, or erysipelas is set up, or there is pyæmia, or so-called septicæmia results. The child is then said to be under the influence of blood-poisoning, and perhaps dies from its effects. This result arises from the *nimia cura amici* and the loved one is killed by kindness.

It is necessary to draw a distinction between hydrophobia and rabies. Many more dogs have the latter disease than the former, and there is less danger of human infection from it. Rabid dogs are inclined to bite at everything that comes in their way, whilst hydrophobic dogs only bite those who interfere with them; the former animal is thirsty, wants water, but can't drink it, and foams at the mouth, and has fits, howls and barks. The latter dreads the sight of water and is almost convulsed if made to touch it, but does not foam and does not have fits, and does not howl or bark.

As regards the treatment of dogs suspected of madness, it is wrong to kill a suspected dog at once, compulsory confinement should not, however, be long continued, as if the signs do not develop themselves soon the dogs may be let alone, but all ownerless dogs should be destroyed. I think it most unwise to muzzle the poor animals, as if anything will develop the disease, it is the miserable contrivances which are used for this purpose. It ought to be put a stop to by the Society for the Prevention of Cruelty to Animals.

Gun-shot wounds are not often likely to require attention among school boys, but the effects are to be met in the manner proposed for contused and lacerated wounds.

When small shots have penetrated some depth it is unwise to poke about with probes to try and get them out. Cover up the part with carbolised oil, and let the shot alone, it will probably become encysted and give no trouble provided the boy is in a healthy state, or it may find its way out in the course of time.

The same principles should guide in those injuries that result from the explosion of gun caps or gunpowder. It is best to avoid irritating the part by injudicious efforts to extract that which is not clearly seen: it will probably be expelled by natural processes if it be let alone.

Pieces of glass bottles and broken pottery may be easily felt, and should be extracted by the aid of forceps or tweezers. They ought not to be left in a wound, as their sharp edges are sure to irritate.

Wounds on the scalp require the hair to be cut away on either side of the wound for a short distance, and that it be picked cleanly out of the wound, otherwise it is likely to set up irritation.

Erysipelas.—This name is applied to several kinds of complaints, they are all more or less infectious, and I deal with this class here because it is so intimately associated with wounds and the bites of animals. There is the so-called St. Anthony's fire, which attacks the face, it seldom appears upon children, it is connected with errors of diet and bad feeding, rather than outward injury, but it sometimes becomes infectious and is capable of spreading from the face of one person to a wound upon the hand of another. Care must be always taken that the materials which are used for the benefit of the subject of facial erysipelas be not brought into contact with wounds upon another child, or of being in any way introduced into the bodies of children. I have every reason to believe that the fatal epidemic of peritonitis (Inflammation of the Bowels), which invaded the Royal Patriotic Schools at Wandsworth a few years ago, and which led to the death of a highly-accomplished physician, was caused by the *debris* from some cases of facial erysipelas accidentally finding their way into the drinking water with which the children were supplied. The case was not absolutely proved, but to my mind the circumstantial evidence was strong enough to be equal to proof. This kind of erysipelas is sometimes called idiopathic, as distinct from that which is styled traumatic. The terms mean that in the one case the disease has apparently appeared spontaneously, in the other it has attacked a wounded

part. In the one case it has arisen within the body, in the other it has appeared as if from without; but in both it is due to the action of infective particles which are capable of reproducing their kind in the tissues of the victim. It is probable that the germs which can set up erysipelatous action are more or less prevalent everywhere, but they do not spring into activity unless the soil (that is, the fluids of the body) are fitted to force them into active development. In some cases, in consequence of improper feeding, and from the effect of impure air, such as arises from close packing or want of ventilation, the bodies of children are extremely prone to take on this action, and several cases of erysipelas may appear in a given school in very rapid succession. If this be so, it is certain that there is one of two things, either the children are too closely packed and they have bad air supplied to them, or else that they have been fed with improper food, or both causes may be at work at the same time. Whenever such conditions arise, it is the duty of the managers to make a most searching inquiry as to the error, and if it be in their own domain, to have it rectified at once. The conditions do not often arise in day schools, because it is probably more generally due to the character of the food supplies than to outside influences; but if there is close packing in the school, the effect of bad food provided at home will be more immediately made manifest. It has been usual to consider idiopathic erysipelas as quite distinct from traumatic, but there is too close an alliance between them to doubt but that they are convertible, and that as great care must be taken to prevent the extension of the one as ought to be always done to keep the other in check. The poison which produces erysipelas may be developed in any wound, even if it be a scratch only, provided the scratch is constantly irritated by friction or by irritating applications, and the blood of the child in an impure state. It will be likely to arise in any one with impurities of a certain kind; it is especially promoted by gross feeding and the use of stimulants. It is, however, much more likely to arise in a lacerated wound, or one made by a rusty nail or other blunt weapon, than in a clean cut. A reiteration of irritation in a wound forces the particles which are the effect of the injury into a further, or rather a lower state of development. Particles which are called micrococci, or, as I prefer to call them, cacozymes, as distinguishing them from more fully-developed and healthier protoplasm, become the vehicles for the dissemination of infective material, and the chemical changes which this material induces sooner or later sets up the action which is called erysipelas. The cacozymes play, it may be, a mechanical part in the distribution of the mischief, their excretions (for they must have excretions) being the chemical agents which spread the evil. The continued reproduction of injury in a wound causes these agents to become infectious, if the soil in which they are grown is bad: and when once their infective character is established, it is propagated wherever it finds suitable soil for its development, and that soil is the ordinary state of a wounded part of the human economy. It has been shown on very satisfactory evidence that the effect of injury is the outpouring of so-called leucocytes (lymph particles) into the intercellular tissue around the part injured. If the injury is not a continuous one, the lymph is absorbed by the lymphatics, and the effect ceases; but if it be reiterated, and inflammation goes on, the lymph is the pabulum, by means of which the ordinary harmless microzymes or bacteria are enabled to increase and multiply, and change their character into infective agents or cacozymes. Let the leucocytes or lymph particles be the outpourings of an unhealthy constitution, and there is material at hand to vary the character of the fluid by means of which it becomes infective, and is capable of producing chemical changes in the tissues of other people as well as the particular subject of the injury. An infective stage is produced, and which may set up erysipelas, or in some other condition; or a so-called tubercular state of constitution may arise, according as the tendency of the child's blood leads in one direction or another.

(To be continued.)

Anecdotal Natural History.

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No. XVI.—THE MONKEY TRIBE.

PART IV.

WE have already seen how wonderfully the bodily frame of the monkeys inhabiting the Old World is adapted to the habits of their existence; carrying out the universal rule that the structure of every animal, be it high or low in the order of Nature, is exactly suited to the life which that animal is intended to lead.

In every detail, both of the external and internal anatomy, do we find this to be the case, from man himself, at one end of the scale, to the mere living atoms at the other which form the connecting links between the animal and the vegetable kingdoms.

Liberal, however, as Nature has been to the monkeys about which we have already been reading, as regards their physical qualifications for the existence they are intended to lead, she has been yet more generous to some of the quadrumana of the American continent, presenting them with what is to all intents and purposes a fifth limb, in addition to the four with which their less favoured relatives are obliged to be content. This additional limb, if we may so call it, is found in the tail, which differs very considerably from the caudal appendages of monkeys of other parts of the world.

Not only is this organ endowed with wonderful strength, but the extremity, which is entirely denuded of hair upon the lower surface, is gifted with so delicate a sense of touch that it can be applied to almost all the purposes for which the hand is ordinarily employed. Thus, it is equally capable of supporting the entire weight of its owner for a considerable time as he rests suspended from some lofty bough, or of abstracting the eggs from a bird's nest in some crevice too narrow for the hand to enter.

Again, when one of these Spider-Monkeys, as they are popularly termed, is moving among the branches of its leafy home the tail seems to be of paramount importance, for the animal is seldom seen to progress a single pace unless the extremity of that organ is coiled round some firm and stable bough. Upon the rare occasions, however, when no such available object

presents itself, the whole tail is thrown over the back, and serves to balance its possessor until the nature of the surroundings will again allow of its being used in the orthodox manner.

There is a curious structure about this tail which obliges it naturally to fall into the position which it assumes when coiled round a branch, or other object, in much the same manner as the hand of a human being contracts when the muscles are allowed to relax. To hold the fingers perfectly straight from the palm requires a definite exertion, and the same appears to be the case with the tail of a spider-monkey, although in a far more strongly marked degree. Neither does this peculiar provision end with the life of the animal, for, if mortally wounded, but not instantly killed, a spider-monkey almost invariably suspends itself from some branch, and expires in a pendent position; and so powerful is the action of the muscles as they stiffen in death, that the body does not fall from the bough, but continues to hang until decomposition sets in, and relaxes the rigid fibres.

It cannot but seem strange that, although they are provided with so useful an auxiliary in the shape of a prehensile tail, these spider-monkeys should yet be inferior in general activity to many of the monkeys of the Old World. Thus the gibbons far surpass them in the quickness and agility of their movements, notwithstanding the total want of caudal appendage which is one of their distinguishing characteristics.

Yet, when occasion arises, these monkeys can be wonderfully active, and will travel through the forests with rapidity equalled by no other creatures save the denizens of air, allowing nothing but a broad stream to check their course.

The smaller rivers they are said to cross in a very singular and ingenious manner.

The band having arrived at the bank, one of the most powerful animals ascends a lofty tree growing near the edge of the water, and firmly twists his tail round some overhanging bough, grasping it also with his hind feet, and allows his body to rest suspended, with his head towards the ground. A second follows him, and grasps his predecessor round the body. A third clasps the second in like manner, a fourth the third, and so on until a chain is formed of sufficient length to reach the ground.

As soon as this is the case, the lowest monkey, who is always one of the strongest of the band, pushes himself violently away from the ground in such a manner as to set the entire chain in motion, something like the pendulum of a huge clock. This movement is gradually increased until he is able to grasp some branch upon the opposite side of the stream, when he works his way up to the topmost branches, the chain of monkeys thus forming a living bridge across the obstacle to their progress. Over the bridge pass the rest of the band, until the whole number have crossed in safety.

As soon as this is the case, the first monkey releases his hold, and the bridge itself swings across the stream, the animals which compose it either dropping to the ground or clambering into the branches as soon as they reach the bank. In this manner the entire band is enabled to cross the watery barrier without the necessity of more than one or two of them wetting their fur in the passage.

Those that form the last links of the chain are necessarily dragged through the water, but they care nothing for it. Like most mammals, monkeys can swim well enough, using their arms and legs just as a dog does when it swims.

Active as they can be, however, when occasion requires, these monkeys are very far from being so as a general rule, their ordinary habits, indeed, being rather slothful than otherwise. They will sit for hours together without moving a limb, their sole object appearing to pass through life with as little active exertion as can possibly be managed.

This indolent nature is remarked by Mr. C. B. Brown, in his 'Canoe and Camp Life in British Guiana.' He tells us:—'The quatas, or large black spider-monkeys, spent a good deal of their time in trying to open the Brazil nuts by breaking them against the branches of trees, or on hard logs upon the ground; and as we passed a grove of Brazil-nut-trees it was amusing to hear the hammering sounds produced by these fellows at their self-imposed tasks. Where a single monkey was thus employed the blows were most laughably "few and far between," the creature showing its true indolent character by the slow way in which it performed its work, resting for a few minutes between every blow. It also showed an amount of perseverance, however, that one would not look for in a monkey, and a knowledge that it would eventually reap a reward for its hard labour.'

The name of 'Spider'-monkeys has been applied to the animals of this group on account of the strangely spider-like appearance caused by the small head, slight body, and long slender limbs. This resemblance is still more strongly apparent when the animal essays to walk upon level ground, its somewhat ungainly movements reminding one very forcibly of those of a large spider under similar circumstances.

To the monkeys which compose the first genus of the group the name *Ateles* has been given, on account of the almost total absence of thumbs upon the fore-paws. It is formed from the Greek words signifying the want of a joint.

In some of the spider-monkeys these organs are merely rudimentary, while in none are they of sufficient size to be of any particular service to their owner.

A curiously formed member of the genus *Ateles* is the Chameck (*A. chameck*), a native of Brazil. The remarkable appearance of this animal is chiefly owing to the length of the fur, more especially upon the hinder quarters and the tail, where it is very thick and bushy. The last few inches, however, of the latter organ are almost entirely denuded of hair upon the upper surface, and altogether so upon the lower, just as is the case with all the monkeys of this curious group.

The nostrils are very different from those of most of the quadrumana, for they open at the side instead of underneath, and are widely separated from one another by a broad cartilage.

The chameck is not a very large animal, the entire length of the body, exclusive of the tail, seldom exceeding twenty or twenty-one inches. The tail is usually about two feet in length. The animal is tolerably common in those parts of the country which it frequents, and is often taken captive and domesticated, an easier task than is the case with monkeys in general. For the temper of the chameck is unusually mild and gentle, and it does not appear liable to the sudden fits of uncalled-for passion which characterize so many of the monkey tribe when brought into captivity.

Another well-known spider-monkey is the Marimonda (*Ateles Belzebuth*), which is found in great plenty in Spanish Guiana, and also, although in lesser numbers, in other parts of Central America.

The specific name of this animal can hardly be considered as appropriate, for it is one of the most mild and peaceable in disposition of all the monkey tribe. Indeed, the colour of the fur upon the upper parts of the body, where it is of a deep jet-black hue, would seem to constitute the only possible reason why so far from descriptive a title should have been applied to the gentle and harmless marimonda.

Next we come to the famous group of the Howler monkeys, animals celebrated for the harsh and discordant cries which they continually utter from dusk to dawn, and which are audible for at least a mile in every direction. Many a weary traveller has been driven almost frantic with the dissonant yells of these alouattes, as they are often called, repose being an utter impossibility until the approaching daylight puts an end to their mournful outcry.

Even the cry of a single howler is troublesome enough, but the effect is very greatly intensified when, as generally happens, a number of these monkeys combine forces, and lift up their voices in dismal concert, each striving to outdo his companions in the strength and volume of his vociferations. Mr. C. B. Brown, whose work on British Guiana has already been quoted in this article, gives the following description of the nocturnal performances of the howler monkey:—

'At early morning, at dusk, and throughout the night, at all our camping-places, we were accustomed to hear the howlers serenading. To my mind the sounds produced by these monkeys more nearly resembled a roar than a howl, and, when sufficiently far off, are not unpleasant to the ear. When heard from a distance of half-a-mile or so, they seem to begin with low notes, swelling gradually into louder and longer ones till they merge into a prolonged roar, which dies gradually away with a mournful cadence.

'When not more than one or two hundred yards away, and consequently plainly heard, they commence with a series of short howls, which break off with grunts, and, at every repetition, become longer and longer until their voices have got fairly in tune, when they give their final roar, which dies so gradually away. Then, after an instant's silence, a few deep grunts are given, as if the remains of the compressed air in their throat drums were being got rid of.

'Listening carefully to the performance, one can detect a voice at a much higher key than the others, especially in the dying-away portion. The Indians say this is made by a dwarf monkey of the same family which accompanies every troop. I was of the opinion that it was the voice of a female howler, but the Indians, who are very careful observers, said it was not. With their black, negro-like faces, and long red beards covering the bony howling apparatus below their throats, they are curious-looking creatures.'

The late Charles Waterton took a great interest in these monkeys, especially the great red howler.

'Nothing,' he writes, 'can sound more dreadful than its nocturnal howlings.

'While lying in your hammock in these gloomy and immeasurable wilds, you hear him howling at intervals from eleven o'clock at night till daybreak. You would suppose that half the wild beasts of the forest were collecting for the work of carnage. Now it is the tremendous roar of the jaguar as he springs on his prey. Now it changes to the deep growlings as he is pressed on all sides by superior force, and now you hear his last dying moan beneath a mortal wound.'

For the capacity of uttering these varied sounds, the howler is indebted to a modification of the peculiar bones which exist in the root of the tongue. In carving an ordinary ox tongue, some small bones are always found at its base. These are portions of the 'hyoid' bone, a most remarkable adjunct to the skeleton. In the fishes it divides into a double set of arches on which the gills are supported. In some of the birds it passes on either side of the head and over the skull, the ends being fixed to the forehead.

But in the howler it is developed into an organ of sound. It is so large that when the male howler opens its mouth you can see the upper part of the apparatus in the back of the throat. Its cavity will contain, as a rule, four or five cubic inches of water.

Besides this bony sac, the larynx, or windpipe, is modified into a number of hollow pouches, and so, by means of the reverberation of air in this complicated apparatus, the howler is able to produce the wonderful series of sounds which have been described.

One of the most plentiful of the howler monkeys is the Araguato, or Ursine Howler (*Mycetes ursinus*), which, with the usual perversity of colonists in the way of zoological nomenclature, is more generally known as the baboon. It is a tolerably large animal, an adult specimen measuring nearly three feet in length, exclusive of the tail, which is at least as long as the body and head together. In colour it is a rich reddish-brown.

It was this monkey, by the way, that furnished the 'nondescript' of which Mr. Waterton was so proud. He took the head and shoulders of a red howler monkey, removed a quantity of hair from the upper part of the head, and then, by his peculiar process of taxidermy, modelled the skin so that when dry it bore a most grotesque resemblance to the head of an old man. Visitors to Walton Hall, where Mr. Waterton kept his museum until he died, mostly mistook it for a human head, and used to blame Mr. Waterton for shooting natives for the purpose of displaying his skill in taxidermy.

The flesh of the araguato is much eaten by the Indians, who capture the animal in a singular and ingenious manner. Taking a nut of the caccarali, or monkey-pot tree (*Lecythis*), which, when hollowed out, forms a capacious vessel with a small mouth, they partly fill it with sugar, and place it in some conspicuous situation in the haunts of the expected victim. The bait thus laid, they retire to some spot where, themselves unseen, they can obtain a view of the scene of action.

Before very long, a monkey detects the nut, and forthwith inserts a paw in order to obtain the enclosed dainty, of which he immediately grasps a large handful. But, although his open hand slipped easily enough through the orifice in the nut, the closed fist cannot pass through the narrow opening, and the monkey is therefore obliged to choose one of two courses, *i. e.*, to relinquish the sweet booty, or to pass the remainder of his existence with one limb imprisoned in the treacherous vessel.

To the first of these proceedings, being a very greedy animal, he is decidedly averse, and, while he is

deliberating, the hunters issue forth from their concealment, and give chase to their intended victim. Never very active upon level ground, the monkey is still further incommoded by the weight and size of its burden, and the deprivation of one of its limbs, and so quickly succumbs to the weapons of its pursuers.

Several species of howler monkeys are known to science, but as their habits are all of a very similar nature, they need not be separately described.

In the Capucin monkeys the tail is entirely covered with hair, but is nevertheless possessed of considerable prehensile power. These monkeys are all pretty and playful little creatures, and are held in great favour as pets both by the settlers and the natives.

In the next group, however, the tail entirely loses its prehensile qualities, and, although it can be coiled round any object, is quite useless as an auxiliary to the limbs in the arboreal evolutions of its owner. The monkeys of this group are known as Tee-tees, or squirrel monkeys, the latter title having been applied to them on account of their squirrel-like form, and wonderful activity among the branches. Scientifically they are known by the generic name of *Callithrix*, a word signifying 'beautiful hair,' the application of which is evident enough. They are all natives of the Brazils.

The disposition of the tee-tees is singularly mild and gentle, these pretty little animals seeming scarcely to know what anger and ill-temper means, being therein very different from the generality of the monkey tribe. In consequence of this docile nature they are greatly esteemed as household pets, and are sure to become favourites with all with whom they come into contact.

The Cuxio, or Bearded Saki (*Brachyurus Satanas*) presents a very strange appearance, on account of the long black beard which decorates the jaws and chin, and the wonderfully bushy nature of the tail. Of its facial ornament the animal is wonderfully proud, carefully carrying water to its mouth in the hollows of its hands in order that the beard may not be wetted by contact with the liquid. It is rather curious, however, that this precaution is only taken when the animal thinks itself unseen, for before spectators it drinks just like any other monkey.

As regards its disposition, the cuxio presents a very great contrast to the capucins and tee-tees, being as irascible and sullen as those animals are mild and peaceable. When attacked by one of the furious gusts of passion which seem inherent to its very nature, it becomes a very formidable antagonist, making use of its sharp teeth and powerful jaws with terrible effect. So keen are these teeth, and so strong the muscles which work them, that an infuriated cuxio has been known to drive its weapons deeply into a wooden plank; so we may easily conjecture the nature of the wounds which it can inflict upon the flesh of its luckless adversary.

Unlike the American monkeys in general, the cuxio does not live in companies, but passes a comparatively solitary existence, contented with the society of its own family. Putting the beard and the bushy tail upon one side, it is not a very striking animal in appearance, the colour of the fur being merely a grizzled brown in the male, and a dull rusty red in the female. The head is large in proportion to the remainder of the body, while its apparent size is greatly increased by the masses of thick hair which cover it, and which fall over the temple and face.

Another of these animals, the Black Yarke, or White-headed Saki (*Pithecia leucocephala*), may at once be recognized by the thick fringe of white hair which surrounds the face. Reversing the usual order of things, this hairy fringe is comparatively short in the male, but long and drooping in the female. The fur of the body and limbs is of a deep blackish-brown hue, except upon the throat and chin, which are almost denuded of hair, the naked skin being of an orange colour.

This animal, in common with the cuxio before described, is said to feed almost entirely upon wild bees and the honeycomb which it extracts from their nests.

(*To be continued.*)

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Eminent Practical Teachers.

PESTALOZZI.

BY THE REV. CANON WARBURTON, M.A.,
Her Majesty's Inspector of Training Colleges for Schoolmistresses.

IV.

A REVIEW of the characteristic features of Pestalozzi's educational system was promised in this number, but since the date at which the last notice of him appeared, its contributor has been put in possession of some original MSS. written from Yverdun Castle in the years 1819—22, of which he is permitted, by the kindness of the writer's daughter, to bring a few extracts before the readers of this periodical. It seemed desirable that, being chiefly of a personal character, these extracts should follow the account of Pestalozzi's life, and precede that of his system. The letters are numerous and interesting, but the special information bearing upon Pestalozzi is so frequently mixed up with matters of a private nature, that it cannot always be communicated to the general reader. The writer of these documents, the late Dr. Mayo, so well known in later life in connection with his school at Cheam, and with the Home and Colonial Training College—was, when a young man, engaged for some years as chaplain and English instructor in Pestalozzi's great institution at Yverdun, and the letters will, it is hoped, be read with interest as giving the fresh and unstudied expression of the writer's experiences of the place and of the man.

'1819.

'Yverdun.—On the margin of a lake, the length of which the eye is not certain that it defines, a collection of houses presents itself; a church steeple rises above the roofs, and near it four towers of no great elevation at the four angles of a large building, arrest your attention....Observe it a little more attentively:—one tower, you perceive, is much higher than the other three; all circular and covered with something like an inverted "pottle" of tiling. They are connected by a plain frontage with a heavy sloping roof, pierced with irregular windows, and deformed with various appendages....Without grandeur, picturesque beauty, elegance or neatness, without excellence in form or colour, it presents the most uninteresting *mélange* of incongruous parts I ever beheld. This delectable *morceau* of Swiss architecture you approach through a miserable avenue of starveling poplars, which you

behold with more than ordinary disgust, from the disappointed hope which you had formed, that when you quitted France you had seen the last of them.... I was conducted to the château, and introduced to the principal members of the establishment. Several of them had assembled in the best room of the building, and among them Pestalozzi, whom, to do honour to the English clergyman, the institution had had washed, shaved, and dressed. This circumstance made the double salute with which he honoured me less overpowering than some I have since received. But you wish me to describe him:—he is then, to use a phrase more expressive than elegant, a little weazen old man, upwards of 70, stooping a good deal in the shoulders, but apparently from a habit of looking on the ground, and not from age or decay. There is nothing very remarkable in his countenance, no very peculiar expression of benevolence, no strong indication of a powerful mind, that I could discern. There is an air of abstraction, but that I think a very ambiguous sign, and it shows that the mind is prone to wander from the sphere in which the body actually moves, but it does not indicate whither it has wandered, or whether it is vigorously and efficiently occupied. His walk, when he is by himself, is a shuffle, effected by a curvilinear movement of his legs which, without lifting his feet from the ground, makes them form a kind of oval, completed by his bringing his toes into contact. When he is receiving guests, or leaving a room with strangers in it, he adds to the shuffle a kind of jerk, which however does not reach lower than his ankles. Schmid, the active manager of the institution, has much more of the air of a man of the world....The general cast of his face and figure indicates strength: he strikes you as a man of powerful mind, devoting its energies to practical purposes.'

'1819.

'It is delightful to live under the same roof with Pestalozzi: every action of his life is characterized by the most exuberant philanthropy. Had (this) been checked by a little more prudence, it would perhaps have produced more benefit to mankind.'

'1819.

'Things go on here pretty well. For myself I am quite satisfied, but Schmid wants in heart what P. wants in head. He (Pestalozzi) is a strong instance of the necessity of a little worldly prudence: the want of it has involved him in difficulties and hardships through life: has cooled his friends, heated his enemies, cramped his exertions for the good of others.'

'1821.

'While we were sitting at dinner on Saturday, the Crown Prince of Denmark was abruptly ushered into the room. We all jumped up from our chairs. Old P. was as brisk as a bee—did the honours with his usual grace; while the rest of the party, one by one, made their escape. I had the honour of being introduced. He is a fine-looking man, affable and easy in his manner. The Princess was affected even to tears at the examination of the little children, and both declared that had they been educated in the same manner their knowledge would have been more extensive and more clear. These are our gleams of sunshine. . . . One honest John Bull, who was accidentally born a peer of the realm (good honest man, he could not help it)—has been to see us, and cried out to her ladyship, "Come, don't dawdle here—it's nothing more than the English plan, only more troublesome."

'Mrs. —— is continually boring P. with the praises of ——, (a gentleman to whom he once addressed a series of letters on the philosophy of education, but) from whom P. is now entirely estranged as a philosopher. He answers not a word. It is amusing to see them together. The other day she told P. that —— had picked up *his* most beautiful ideas. He said not a word. She then observed that —— had seized the spirit of the system better than any other Englishman. P. was silent. She then turned round to me and made the same remark in French. I parried the question in a manner that made P. laugh heartily. Schmid told me afterwards that P. was hugely tickled with what I said, and recounted the whole circumstance, laughing most immoderately. The next time P. saw me he placed both his hands on my shoulders and fell to laughing and kissing, kissing and laughing, so that a bystander must have taken him for a fool.'

'1821.

(Dr. Mayo having had an acute attack of illness) 'Pestalozzi was terribly uneasy; he could not rest till the symptoms declared themselves more favourable. He said, "*J'ai eu crainte, comme un pauvre diable.*" He comes early in the morning to my bedside, kisses my hand when I place it in his, and when I tell him I am better he is quite delighted, and exclaims, "*Grâces à Dieu—grâces à Dieu!*"'

'1821.

'Pestalozzi completed this day his 76th year. His grey hair, his careworn countenance, his hollow eye and bent figure, proclaim that many days, and those days of trouble, have passed over his head. His heart, however, seems still young—the same warm and active benevolence, the same unconquerable hope, the same undoubting confidence, the same generous self-abandonment animate it now, that have led to the many sacrifices and have supported him under the many difficulties and trials of his eventful life. In a thousand little traits of character, which unconsciously escape him, I read the confirmation of his history. It is an affecting sight when the venerable object of the admiration of emperors and princes appears in the midst of his adopted children. Rich and poor, natives and foreigners alike, share his paternal caress and regard him with the same fearless attachment.

'From the sacrifice of home, property, and health for the benefit of a people who do not understand his merit, to the picking up of a child's plaything or the soothing of an infant's sorrow, Pestalozzi is ever prompt to obey the call of humanity and kindness. The sentiment of love reigns so powerfully in his heart, that acts of the highest benevolence or of the most condescending good nature seem to require no effort, but appear the spontaneous manifestations of the one overruling principle.

'I must tell you an anecdote which, simple as it is, shows at once the warmth and the weakness which characterize his benevolence. He was going to visit some friends at Berne, furnished with as much money as he was likely, under such circumstances, to want. According to his usual practice, he falls into conversation with the first peasant to whom he has an opportunity of speaking. He inquires into his means of subsistence, the number of his children, the want and distresses of his family, and so forth. Becoming in-

terested in the man's little story, Pestalozzi gives him the larger portion of the money which he has about him. A similar case soon afterwards presents itself, and the second *recontre* drains his pocket of the last *kreutzer*.* He had nearly reached Berne, when a wretched-looking mendicant comes up to him soliciting relief. Again he fumbles in his pocket, but it is now in vain. What is to be done? He remembers that his buckles are of silver; he hastily takes them from his shoes, thrusts them into the beggar's hand, and drives off.

'Though regarded in Germany as the most extraordinary luminary, and the profoundest practical philosopher of the age; though honoured with the most flattering testimonies of esteem and approbation by courts and universities, Pestalozzi is the most modest and unassuming of men. To all who take an interest in his method of education he addresses himself in the most touching expressions of gratitude, as if they conferred the greatest obligation by examining into the truth of his opinions and the utility of his plans.

'Never shall I forget my first introduction to him. He had been long expecting me, and his lively imagination had anticipated in different manners the probable results of our connection. "Will he like me? Do you think I shall suit him?" were questions he was perpetually putting to our common friend. I had no sooner arrived than he hurried to meet me, and though I understood not the words he uttered,† yet the tone of kindness, the affectionate pressure of the hand, the expression of benignity which lit up his countenance, all assured me I was welcome. Twenty times he rose from his seat, paced with quick, but shuffling step across the room; then, as if suddenly recollecting himself, hastened to place himself near me, to press once more both my hands in his, and to mutter some unintelligible expressions of goodwill.

'In one of the first conversations we had together, he told me how delighted he was that the English began to pay attention to his system, remarking that that union of exalted sentiments with practical good sense which characterizes the nation renders it the most competent to appreciate and execute his plans. "Examine my method," continued he, with his noble candour, "adopt what you find to be good, and reject what you cannot approve. We are doing something here towards the execution of my principles of education, but what we do is still very imperfect: it is in England that my views will be eventually realized."

'You cannot conceive the interest which Pestalozzi awakens, or the influence which he insensibly acquires. All the little barriers behind which reserve or suspicion teach us to entrench ourselves, fall before the childlike simplicity, the unaffected humility, and the feminine tenderness of his heart. Self-interest is shamed into silence while we listen to the aspirations of his boundless benevolence, and if one spark of generous feeling glows in the bosom, the elevated enthusiasm of his character must blow it into a flame. The powers of his original mind serve to maintain the interest which his character first excites. In conversation, however, he is most frequently a listener. Towards those with whom he lives in perfect intimacy he sometimes indulges in a playful but forcible raillery—careful, meanwhile, to avoid giving the slightest pain or uneasiness. He is peculiarly successful in portraying some great character by two or three masterly strokes: in marking, either in retrospect or by anticipation, the influence of political events on national character or national prosperity; in characterizing the different methods of education in vogue; or in tracing the difference between his (own) views and those of certain philosophers, with which they have been confounded.

'There is nothing studied about him. Often as I have heard him enter upon the subject of his system for the information of strangers, I do not recollect him to have taken it up twice from the same point of view. When we have conversed on these subjects, I have sometimes thought his ideas wild and his views impracticable. The faint and misty, but still beautiful light which emanates from his mind I have regarded with a feeling of melancholy delight, for it seemed to indicate that the sun of his genius had set. Still I have been unable to dismiss from my mind his loose and ill-digested hints: after frequent reconsiderations of them, they have appeared more clear and more feasible, and I have subsequently traced their influence in the opinions I have adopted, and in the plans of instruction which I have pursued.

'Pestalozzi once known is never forgotten. I have talked with men who have not seen him for years, or whom the current of events has separated from all intercourse with him. His honoured image lives as fresh in their memory as if their communication had never been suspended or broken. Anecdotes illustrating his benevolence are current in their families, and their children anticipate the delight of one day receiving the parental caress of good Father Pestalozzi. Many of my own countrymen, who have enjoyed the privilege of his society, will, I am sure, carry the remembrance of him to their graves. For myself—his unwearied kindness, his affectionate solicitude for my health and comfort, the numberless testimonies of his esteem and regard which I daily receive, are engraven on my heart in characters which can never be effaced.

'It will ever be a source of proud satisfaction to me that Pestalozzi has honoured me with the title of friend; and should I attain, myself, to a good old age, my decline will be cheered with the remembrance that I have contributed, as he himself declares, to shed a happy serenity over the evening of his life.'

Mr. Mayo appears to have, in the first instance, attached himself to Pestalozzi's staff without any ulterior object; but the idea gradually dawned upon him of first imbuing himself thoroughly with the principles of the great master, and then returning home and establishing a Pestalozzian School in England free from the oddities, the irregularities, the waste, the dissensions, and, alas! the *dirt* which clogged the works of the Swiss institution. In a letter dated Jan., 1820, he talks of 'setting up a Pestalozzian menagerie of his own.' 'The die,' he writes, Oct., 1820, 'is cast for me: I am a Pestalozzian through life, with no other temporal object but the establishment of this method of education in my own country.' In this idea he was strongly encouraged by Pestalozzi himself, whose great ambition and desire was that his principles should be planted in England, where he thought the conditions peculiarly favourable to their taking root.

When Mr. Mayo left him, Pestalozzi presented to him, among other parting gifts, a screen, now in the

* Kreutzer, a German coin worth a little more than a farthing.

† The writer did not, at this time, understand German.

possession of Miss Mayo, with a likeness of himself in his own study at Yverdun, and with pictures on the study walls of Stanz, of 'Gertrude teaching her Children,' and of a green and flourishing tree, representing his own never-dying hope. He also conferred upon Mr. Mayo a sort of testimonial, written in German of the most involved and clumsy character possible, which concludes thus:—

'He has, with great readiness, deep insight, and gratifying success, aided me in my pursuit of the main object of my life; in regard to which, by his unprejudiced, calm, and at the same time cordial behaviour, he has attained to a very intimate and thorough familiarity with our purposes, principles, and methods, and especially with the peculiarities of our system of education and instruction. So much has this been the case, that I have long since learned to regard him as a matured and benevolent counsellor in my own domestic concerns.

'I am convinced that, as his presence has proved a blessing to myself and to my house, it will also (through his mature insight into our efforts and his firm conviction of the great and essential advantages which some, at least, of them offer) prove, in time to come, a blessing also to his native land, so wont to embrace with vigour, and promote with liberality, every good movement which comes under its notice. His noble heart cherishes this desire as warmly as his intellect grasps the means of attaining it in all its purity, depth, and manysidedness.

'God be with you, my dear, dear friend! May my heartfelt thanks, my sincerest affection, and the ardent longing once again to meet you in this world, and once again by your side to indulge hopes which can only be fulfilled beyond the grave, accompany you on your way and bring you happily home to your fatherland, and to the mother whom you love so heartily and so filially, 'PESTALOZZI.

'*Yverdun, Switzerland, April 8th*, 1822.'

—o—

'How I Teach Elementary Science.'

BY RICHARD BALCHIN,
Head Master of the Gloucester Road Board School, London.

FOURTH-SCHEDULE SUBJECTS: MECHANICS.

THE third stage of this subject is the one in which the boys manifest the greatest interest. All the facts can be laid open to their view by striking experiments. Indeed, the boys themselves may work the experiments, and from their own observation of the facts arrived at, deduce the law. I have before stated, that speaking generally, the whole syllabus of this subject—Mechanics—may be arranged thus:—

1st stage; Matter; its states, and properties.
2nd „ Matter acted upon by force.
3rd „ Force accomplishing work.

The third stage embraces what is usually understood as mechanics; while stages 1 and 2 pass under the more general term, 'Natural Philosophy.' The following is the syllabus of the third stage as it appears in the Code.

Simple mechanical powers: liquids under pressure: the hydrostatic press: liquids under gravity, or the gravity of liquids: parallelogram of velocities and of forces.

As in stages 1 and 2, I have prepared a detailed scheme of lessons to be given during the year; and from which the Inspector has always selected the questions for examination. It is as follows:—

1. Simple mechanical powers: meaning of machine: simple machines: complex or compound machines: (*a*) the lever; different kinds; definition; relation between power and weight, power arm and weight arm: meaning of statement that 'power is gained at the expense of time or distance.' Centre of gravity of lever. Every-day instances of use of lever. (*b*) The wheel and axle: definition: a modification of the lever: common instances of its use: relation between power and weight, diameter of wheel and of axle; units of work performed by power equals those performed by weight. (*c*) Pulleys: definition; fixed and movable pulleys: block pulleys; common instances; relation of power and weight. (*d*) Inclined plane: definition; common uses; advantage gained; relation of power, weight, length of plane and perpendicular height. (*e*) Wedge and screw.

2. Liquids under pressure. Difference of results by exerting pressure upon the surface of a liquid and on a solid. Law of liquid pressure: liquid pressure due (*a*) to the exertion of mechanical force, or (*b*) to the gravity of the liquid. The hydrostatic press, its construction and principle of action: an instance of the 'dispersion of force but not of its creation:' meaning of this.

3. Liquids under gravity: meaning of 'gravity of the liquid,' *i.e.*, its tendency to fall to the earth. Difference between solids under gravity and liquids under gravity, a difference due to the greater mobility of the molecules of the latter. The pressure of liquids due to their gravity: pressure of liquids on the sides and bottoms of the containing vessels: construction of reservoirs. The surface of liquids at rest is level, why? The amount of convexity of liquids on the earth's surface is eight inches in a mile, reason of this. Floating and immersed bodies; why a body sinks, why it floats. Law of liquid displacement. Centre of buoyancy. Weight of water; specific gravity.

4. Parallelogram of velocities and of forces: resultants as to velocity and force when two or more forces act in same direction, or in opposite, or in different but not opposite directions.

From this syllabus, it will be seen and readily acknowledged that there certainly is no other subject of ordinary elementary instruction that can possibly exert so great an educative influence over the minds of the boys, or which is likely to be of more practical utility in their after lives. At the risk of being considered boastful, I will mention an incident that occurred the 27th of last month. I am on the Committee for the extension of university teaching. We determined to wind up a very successful course of lectures by Dr. Lavington Hart, on electricty, by giving a scientific soirée. During the evening we had an exhibition of the various forms of electric lights, arc, and incandescent; of telephones, microphones, phonographs, etc. At one end of the hall, a crowd had gathered round a gentleman who was energetically explaining the construction and action of a phonograph he had himself made. I thought I knew this gentleman. Later on in the evening he came to me, shook hands and asked if I remembered him? I was sorry to say I had forgotten his name, but knew his voice and features. Then he said 'I

was a boy in your old British School. You gave a course of lessons on mechanics and machinery; and one day explained the action of the steam engine from a working model that your brother had made. Well, you led us to see the necessity of having some contrivance for admitting the steam to the upper and lower part of the cylinder alternately. You did not explain how this was done, you left us in a fog about it; but you told us to go home and write out in our exercise books any plan we could think of that would accomplish what was wanted. It was the first and greatest delight I ever had in my life, when, after examining our books, you came, and before the whole division, stated that I was the only boy who had thought of a plan that would do, and that I had in fact hit upon the exact principle of action of the D valve: which you then showed us in the model. Well sir, that little event shaped my future. I have been for the last two or three years an electric engineer.' (*Note.*—I have given the Editor the name and address of this gentleman, though of course not for publication.) Now I should like to ask my fellow-teachers whether anything like this educative influence can be obtained by teaching any other of the Fourth Schedule subjects? Well may the School Board Inspectors express regret, as they all do in their annual reports, that 'Mechanics' is so seldom taken. Physiology is almost universal. In fact Her Majesty's Inspectors have told me that they are quite sick and tired of hearing and reading about 'humerus,' 'ulna and radius,' etc. Against teaching the *science* of physiology I say nothing, but, as Dr. Gladstone remarked to me last Monday, we never get to the science. What real educative value can there possibly be in learning by rote the mere names of some bones, some muscles, and certain parts of the body! 'Please mum,' wrote a fond and anxious mother to a head mistress in my neighbourhood, 'don't teach my little gall no more about her inside, it don't do her no good, and its rude.'

If a teacher decides to take mechanics, he will have to make his own apparatus. He will want something to illustrate the mechanical powers, to begin with. I heard that the School Board for London let out on loan to its teachers a box of models. I at once applied; and after waiting six months, received a little box of the stupidest jimcracks it is possible to conceive of. It was an exercise of Jobic patience to set them up. When they were set up they would not work, or, if they did, showed a result quite different from the one, one wanted. I put them away 'to be called for,' and set about making my own. In next month's PRACTICAL TEACHER will appear a wood-cut of what I have constructed, with hints how to make it; for it will be found very useful in 'object lesson' teaching, as well as mechanics. It is strong enough for the boys to work themselves. In fact I have not given the class a single rule for working sums in connection with the mechanical powers, etc.; the boys have educed the rules themselves from the experiments they themselves have performed. And how delighted the boys are when the time for this lesson comes round! One boy stands on the table to be high enough to fix the various things on the frame; another boy stands by the table to tell him what to do; and a third boy stands by the black-board with a piece of chalk ready to write down the result of each experiment which is to lead up to the general conclusion. And as for codes, examinations, and percentages, not a thought like that enters my philosophic pate, or troubles it at all.

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ANSWERS TO

Pupil Teachers' Examination Paper.

APRIL 29TH, 1882.

CANDIDATES.

Three hours and a half allowed.

Arithmetic.

MALES.

1. If a stick 2 feet 6 inches long standing upright casts a shadow 3 feet 2 inches long, how high is a tower which at the same time of the same day casts a shadow 57 feet long? Work this sum by the rule of three, and prove your result by the "method of unity," or "first principles."

3 ft. 2 in. : 57 ft. :: 2 ft. 6 in. : height required.
or or or
38 in. : 684 in. :: 30 in. : height required.

$\frac{30 \text{ in} \times 684}{38} = 540 \text{ in.} = \underline{45 \text{ ft.}}$ Ans.

Proof:—
A shadow of 38 in. is cast by a height of 30 in.
∴ " 1 in. " " $\frac{30}{38}$ in.
and ∴ " 684 in. " " $\frac{30}{38}$ in. × 684.
i.e., 540 in. or 45 ft.

2. Compare the cost of 150 oranges at 9½d. a dozen, and that of 3¾ lbs. of tea at 2s. 7d. a lb.

(*a*) 150 oranges at 9½d. per doz. = 12½ at 9½ each = 9s. 6d. + 4¾d. = 9s. 10¾d.
(*b*) 2s. 7d. × 3¾ = 31d. × $\frac{15}{4}$ = $\frac{465}{4}$d. = 116¼d. = 0s. 8¼d.
∴ (*a*) is greater than (*b*) by 2½d.

3. Find the total value of—
3019 articles at 18s. each.
517 articles at £1 18s. each.
2466 articles at 16s. per dozen.
620 dozen at £2 4s. per score.

			£	s.
3019 arts. at 18s. each	= £3019	− £301 18s.	= 2717	2
517 " at £1 18s. "	= £1034	− £51 14s.	= 982	6
2466 " at 16s. per doz.	= £205 10s.	− £41 2s.	= 164	8
620 doz. at £2 4s. per score	= £744	+ £74 8s.	= 818	8
		Total value	= 4082	4

4. 518 ac. 3 rd. 7¾ poles at £18 7s. 6d. per acre.

		£	s.	d.
Value of 1 ac.		18	7	6
				518
" " 518 ac.		9518	5	0
" " 2 ro.	= ½ val. of 1 ac. =	9	3	9
" " 1 "	= ¼ " 2 ro. =	4	11	10½
" " 5 po.	= ½ " 1 " =	0	11	5¼
" " 2½ "	= ½ " 5 po =	0	5	8⅛
" " ¼ "	= 1/10 " 2½ " =	0	0	6⅘
	Total value =	9532	18	5⅞ Ans.

FEMALES.

1. Find the cost of 62,689$\frac{3}{10}$ at £9 13s. 10½d. each.

		£	s.	d.
Value of 62,689 at £1 each	=	62,680	0	0
" " 9 "	=			9
		564,201	10	0
at 10s.	= ½ val. at £1 =	31,344	10	0
3s. 4d.	= ⅓ " 10s. =	10,448	3	4
5d.	= ½ " 3s. 4d. =	1,306	0	5
1d.	= ⅕ " 5d. =	261	4	1
½d.	= ½ " 1d. =	130	12	0½
Value of 3/10 at £9 13s. 10½d. ea.	=	1	10	7$\frac{7}{10}$
	∴ Total value =	607,693	0	5$\frac{7}{10}$

2 Make out the following bill:—18 lbs. of roasting beef at 7½d. per lb., 29 lbs. mutton at 8½d. per lb, 16 lbs. veal at 10d. per lb., 47 lbs. of pork at 9½d. per lb., 85 lbs. boiling beef at 6½d. per lb., 48 lbs. lamb at 7 per lb.

		£	s.	d.
18 lbs. at	7½d. per lb. =	0	11	7½
29 lbs. at	8½d. per lb. =	1	0	6½
16 lbs. at	10d. per lb. =	0	13	4
47 lbs. at	9½d. per lb. =	1	16	2½
85 lbs. at	6½d. per lb. =	2	6	0½
48 lbs. at	7d. per lb. =	1	8	0
		7	15	9½. Ans.

3. If a housekeeper has 3 fires burning regularly, each consuming 30 lbs. of coal daily; what will his year's coal bill be when coals are 13s. 6d. per ton?

lbs. of coal consumed annually = 30 lbs. × 3 × 365 = 32,850 lbs.

∴ 2,240 lbs. : 32,850 lbs. :: 13s. 6d. : amount of bill.

$$\frac{162d. \times 32850}{2240} = \frac{266085d.}{112} = 2375\tfrac{45}{112}d. = £9\ 17s.\ 11\tfrac{45}{112}d.$$

4. What is the value of 70 tons 7 cwts. 2 qrs. 22 lbs., at £37 18s. 8d. per cwt?

				£	s.	d.
Value of 1 cwt.	...	...	... =	37	18	8
				1407		
,,	1407 cwt.		=	53372	4	0
,,	2 qrs. = ½	value of	1 cwt. =	18	19	4
,,	14 lbs. = ¼	,,	2 qr. =	4	14	10
,,	7 lbs. = ½	,,	14 lbs. =	2	7	5
,,	1 lb. = ⅐	,,	7 lbs. =	0	6	9⅐
,,	whole		=	53,398	12	4⅐

Grammar.

1. Point out and parse all the verbs and adjectives in the following:—

'Yet when her master's children
Would clustering round her stand,
She sang them ancient ballads
Of her own native land;
And when at morn and evening
She knelt before God's throne,
The accents of her childhood
Rose to her lips alone.'—PROCTOR.

her—pronom. poss. adj., limiting *master*.
would—auxiliary defec. verb *will, would*, past indic., forming with infin.
stand—past indef. potential of *stand, stood, stood* (intrans. and irreg.), 3rd pers. plur., agreeing with *children*.
clustering—neg. trans. verb, incomplete part., qual. children.
sang—irreg. trans, verb, *sing, sang, sung*, indic., past indef., 3rd pers. sing., agr. with *she*.
ancient—adj., qual. *ballads*.
her own—pron., poss., adj., qual. *land*.
native—adj., qual. *land*.
knelt—irreg. intrans. verb, *kneel, knelt, knelt*, indic., past indef., 3rd pers. sing., agr. with *she*.
her—pronom. poss. adj., limiting *childhood*.
rose—irreg. intrans. verb, *rise, rose, risen*, indic., past indef., 3rd pers. plur., agr. with *accents*.
her—pronom. poss. adj., limiting *lips*.
alone—adj., predicative of *accents*.

2. Point out all the nouns in the possessive and objective cases in the above, and account for their case in each instance.

master's—possessive, to show the possession *children*.
God's— ,, ,, *throne*.
ballads—objective, governed by trans. verb *sang*.
land— ,, ,, prep. *of*.
morn— ,, ,, ,, *at*.
evening— ,, ,, ,, (*at*).
throne— ,, ,, ,, *before*.
childhood— ,, ,, ,, *of*.
lips— ,, ,, ,, *to*.

Geography.

Answer *two questions*.

1. Trace the course of a vessel, sailing round the coast of Ireland, mentioning in order, and describing as fully as you can, the headlands, inlets, and sea-ports it would pass.

If you can, draw a map of the whole or part of this coast.

Fair Head is a large mass of bare rock with cliffs 200 feet high. Turning to the south-east we come to *Belfast Lough*, at the head of which is *Belfast*, the second city in Ireland and chief seat of the linen manufacture; having a most important cross-channel trade. Leaving the Lough we go south to *Strangford Lough*, entering it by a channel six miles long, which leads into a basin fifteen miles long and five or six broad. Passing *Dundrum* and *Carlingford Bays* we come to the *Bay of Dundalk*. The ports of *Dundalk* and *Drogheda* export considerable quantities of agricultural produce. Rounding *Howth Head* we enter *Dublin Bay*, on which stands *Kingston* the port of Dublin. Continuing south we pass *Wicklow Head, Cahore Point, Wexford Harbour*, on which stands *Wexford*, with shipbuilding and extensive trade, and round *Carnsore Point*, the S.E. extremity of Ireland. The voyage along the south coast takes us past *Hook Head, Waterford*, an outlet for agricultural produce, on *Waterford Harbour*, beyond which is *Tramore Bay*, one of the most dangerous places on the Irish coast. We next reach *Youghal Harbour*, and continue our course to *Cork*, whose harbour is capable of containing the entire navy of England, and in the middle is Goat Island, with *Cove* or *Queenstown*. *Cork* is the third port of Ireland, corn and live stock being the chief exports. It trades also with Portugal, Mediterranean, Baltic, and Canada. Passing *Kinsale*, with its excellent harbour and Cape Clear Island, we come to *Mizzen Head*. On the west coast we pass *Bantry*, one of the finest harbours in Europe, *Kenmare River, Valentia Harbour*, an excellent fishing station and harbour. *Dingle Bay*, which is very shallow, *Tralee Bay*, and enter the *Mouth of the Shannon*. Sixty miles up the river stands the port of *Limerick* with trade in agricultural produce. Rounding *Loop Head* we sail north-east and enter *Galway Bay*, on which stands *Galway*, with important salmon fishery. Passing *Slyne Head* we come to *Clew Bay*, at the head of which stand the thriving ports of *Westport* and *Newport*. Sailing past *Erris Head* we turn east to *Killala* and *Sligo Bays* (*Sligo* is a thriving commercial town), north, past *Donegal Bay, Rossan Point, Bloody Foreland*, to *Lough Swilly*, twenty-five miles inland, with good anchorage, though seldom visited by ships. Rounding *Malin Head* we enter *Lough Foyle*, on which stands *Londonderry*, with considerable trade with America and the West Indies. Beyond *Bengore Head* we arrive at *Fair Head*, whence we set out.

2. Describe fully as for children, the mountains and rivers of Wales.

N.B.—Do not give a mere string of names, but *describe* position and character.

The greater part of Wales is occupied with the Cambrian range which is properly an offshoot of the Pennine range, and the connection may be easily traced on the map. The range consists of two parallel chains, one along the north, and the other along the south coast, with a connecting chain between their middle parts running N. and S., forming a figure somewhat like a capital Ξ lying on its side. The *northern range* contains Snowdon, the highest mountain in South Britain, 3590 ft. high. The *central chain* contains Cader Idris, 2950 ft., and Plynlimmon, 2463; and the *southern chain* has Brecknock Beacon, 2862 ft., and the Malvern Hills which approach the Cotswold Hills on the opposite side of the Severn, a river which rises in Plynlimmon, and derives its head waters and the right-bank tributaries from the Cambrian range. In general this range forms the water-parting between the Severn and Bristol Channel on the one side and the Irish Sea on the other. The Dee, the Clwyd, and Conway flow to the N., the Dovey, Ystwith and Teify to the W., all into the Irish sea; the Towey, Tawe, and Taff, into the Bristol Channel; the Rumney, Usk, and Wye, into the Severn. The rivers that flow north and west, with the exception of the Dee, are mere mountain streams, and quite useless for navigation or harbourage. The Severn, Wye, and Usk, are all rivers of importance, but it is only along their upper valleys where the streams are but mountain torrents that these rivers are included in Wales. The Taff, Neath, and Tawe, are only important for their harbours, but the Towey has a longer course, and plays an important part in marking the geographical boundary between the geological regions of Wales.

3. Name *three* towns in each of these counties; *Cheshire, Durham, Aberdeenshire*, and say what you know about each.

(*a*) *Chester* exports cheese,—burial place of Matthew Henry, the commentator,—a very old town.

Birkenhead, a new town opposite Liverpool—fast rising into importance.

Stockport has coal in the neighbourhood, with large manufactures of cotton, silk, machinery, brass and iron goods.

(*b*) *Durham* has a university; a cathedral; a castle built by William the Conqueror; valuable collieries in the vicinity.

Sunderland, great coal-port, has ship-building, and an immense cast-iron bridge over the Wear.

Hartlepool has steam navigation to Hamburg, Rotterdam, and Antwerp.

(*c*) *Aberdeen* is a handsome city of grey granite, a place of great trade, and the seat of a university.

Peterhead, a thriving town near Buchanness, has an important herring fishery, and is a great emporium of the whale-fishery.

Fraserburgh has considerable trade in connection with the herring fishery.

Composition.

Write from dictation the passage given out by the Inspector.

Penmanship.

Write, in large hand, as a specimen of copy-setting the word *Zuider Zee*.

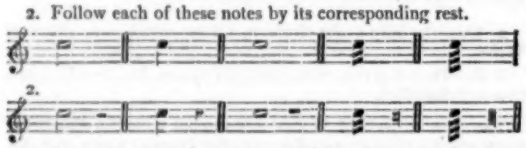
Write, in small hand, as a specimen of copy-setting, *Have you prayed to-night, Desdemona?*

Music.

A quarter of an hour allowed for this paper.

1. Write over each of the following notes its pitch name (C, D, *Do*, *Re*, or other), and under each its duration name (crotchet, quaver, or other).

2. Follow each of these notes by its corresponding rest.



3. Supposing we make one beat while we sing a crotchet, how many shall we make while we sing a dotted minim?

3. If we make *one* beat while we sing a crotchet, we shall make *three* beats while we sing a dotted minim, because a dotted minim is equal in duration to three crotchets.

FIRST YEAR.

Three hours and a half allowed for this Paper.

Arithmetic.

MALES.

1. Find the value of ($\frac{1}{2}$ of £ + $\frac{2}{3}$ of a guinea − $\frac{3}{4}$ of 15s.) × $\frac{4}{5}$ of $\frac{5}{6}$.

$$(6s.\ 8d. + 6s. - 6s.\ 8d.) \times \tfrac{4}{5} \text{ of } \tfrac{5}{6} = \frac{63 \times 31}{32} = \underline{5s.\ 9\tfrac{3}{8}d.}$$

2. Reduce 12 hours 55 minutes $23\frac{1}{13}$ seconds to the decimal of a day.

$$\frac{12 \text{ ho. } 55 \text{ min. } 23\frac{1}{13} \text{ sec.}}{24 \text{ ho.}} = \frac{60480}{86400 \times 13} \text{ sec.} = \tfrac{7}{13} = \underline{\cdot 538461}$$

3. What vulgar fraction of a mile represents the same length as three-quarters of an inch?

$$\frac{\frac{3}{4} \text{ in.}}{1 \text{ ml.}} = \frac{\frac{3}{4} \text{ in.}}{63360 \text{ in.}} = \frac{3}{253440} = \underline{\frac{1}{84480}} \text{ of a mile.}$$

4. If ·2856 lbs. cost £·2884, what is the price of 49·47 lbs.?

·2856 lbs. : 49·47 lbs. :: £·2884 : price required.

$$\frac{£\cdot 2884 \times 49\cdot 47}{\cdot 2856} = \frac{£14\cdot 267148}{\cdot 2856} = £49\cdot 955 = \underline{£49\ 19s.\ 1\tfrac{1}{2}d.}$$

FEMALES.

1. A bankrupt pays his creditors 2s. 7½d. in the pound, and his total payments amount to £750 10s. 6d.; what are his debts?

2s. 7½d. : £750 10s. 6d. :: £1 :: debts.
or or
63 half-d. 360252 half-d.

$$\frac{£1 \times 360252}{63} = £5718\tfrac{18}{21} = \underline{£5718\ 5s.\ 8\tfrac{4}{7}d.} \text{ Ans.}$$

2. If the wages of 27 mechanics for 15 days amount to £135, how many workmen, earning the same rate of wages, may be employed 25 days for £200?

$$\left.\begin{matrix} 25 \text{ days} : 15 \text{ days} \\ £135 : £200 \end{matrix}\right\} :: 27 \text{ men} : \text{No. required.}$$

$$\frac{27 \text{ men} \times 15 \times 200}{25 \times 135} = \underline{24 \text{ men.}} \text{ Ans.}$$

3. If 500,000 bricks, 9 inches long, 4½ in. wide, and 4 in. thick, be required to build a lecture hall, how many would be required 10 in. long, 5 in. wide, and 4½ in. thick?

$9 \times 4\frac{1}{2} \times 4 = 162$ c. in., content of bricks first used.
$10 \times 5 \times 4\frac{1}{2} = 225$ " " " to be used.
∴ 225 : 162 :: 500,000 bricks : No. required.

$$\frac{500{,}000 \times 162}{225} = \underline{360{,}000 \text{ bricks.}} \text{ Ans.}$$

4. If a clerk has a salary of £75 10s. a year, commencing 1st February last, how much should he receive on leaving his employment on the evening of the 6th of next September?

28 + 31 + 30 + 31 + 30 + 31 + 31 + 6 = 218 days in all.
∴ 365 : 218 :: £75½ : sum required.

$$£\frac{151 \times 218}{2 \times 365} = £\tfrac{32918}{730} = \underline{£45\ 1s.\ 10\tfrac{2}{5}d.} \text{ Ans.}$$

Grammar.

1. Point out and parse the adjectives and prepositions in the following:—

'On either side the river lie
Long fields of barley and of rye,
That clothe the wold and meet the sky;
And thro' the fields the road runs by
To many-towered Camelot.'—TENNYSON.

On—prep. gov. obj., case *side*.
either—distributive adj. qual. *river*.
long—adj. qual. *fields*.
of—prep. gov. obj. case *barley* and *rye*.
thro'—prep. gov. obj. case *fields*.
to— " " " " *Camelot*.
many-towered—adj. distinguishing *Camelot*.

2. Personal pronouns must agree with the nouns for which they stand in gender and number. Give examples of this agreement.

Tom took Mary upon the ice,
It broke and *she* fell in.
He got a rope and in a trice
He pulled *her* out again.
If *they* had both been drowned, you know
Folks would have said, 'I told you so.'

3. Prepositions relate the words they govern, sometimes to a noun, sometimes to a verb, sometimes to an adjective, in the sentence. Show to which the preposition relates the word governed in each of the following:—

(*a*) He is not guilty of the crime.
(*b*) The river in that valley has overflowed.
(*c*) The clouds float across the sky.
of relates the noun *crime* to the adjective *guilty*.
in " " *valley* " " noun *river*.
across " *sky* " " verb *float*.

Geography.

1. Draw a map of the Adriatic Sea, and describe the countries on each side of it. Insert the lines of latitude and longitude.

The countries on each side are Italy, Austria, and Turkey.
Italy is highly favoured by nature in climate and soil, but agriculture is in a very backward state. Rice, wheat, and oats

grow abundantly on the plains of the Po; the grape, olive, and fig throughout the Peninsula; and oranges on the southern seaboard. It is divided into sixty provinces. Since 1866 the Peninsula with the islands of Sardinia and Sicily form one State, the kingdom of Italy. The States of the Church, formerly under the government of the Pope, were taken possession of in 1870, and since 1871 Rome has been the capital of the country. The Peninsula is traversed through its whole length by the Apennines. *Austria*, or the Austro-Hungarian Monarchy, has under its dominion a great variety of people and races, and consists of (1) The German provinces. (2) The Slavonian provinces. By the Treaty of Berlin, 1878, Bosnia and Herzgovina are now placed under Austrian occupation and administration. The principal river is the Danube, with many tributaries, and the Carpathians are the chief range of mountains.

Turkey is a mountainous country with a fine climate and fertile soil, but agriculture is neglected. Roses and other aromatic plants are cultivated for the manufacture of perfumes. The chief mountains are the Balkans. By the Treaty of Berlin, Roumania, Servia and Montenegro were constituted independent countries.

2. Describe minutely the course of the Danube.

The Danube from the heights of the Black Forest, in Baden, flows eastward through Hohenzollern, Wurtemburg, Bavaria, Austria, east and south through Hungary, and enters Turkey at Belgrade; it continues east through Turkey, separating Servia from Hungary and Bulgaria from Wallachia, and falls into the Black Sea below the town of Ismail. It receives on the right bank the Iller, Leck, Iser, Inn, all from the Tyrolese Alps, the Drave from Tyrol, and the Save from Carinthia; on its left bank the Naab from the Bohemer Wald, the March from Moravia, and the Waag from the borders of Silesia, and the Theiss from the Carpathian Mountains. In Turkey it receives the Morava, the Isker, the Sereth, and the Pruth.

History.

1. Give the dates of Ethelbert, Alfred the Great, Edgar, and Hardicanute.

Ethelbert	reigned	from	860	till	866.
Alfred	,,	,,	871	,,	901.
Edgar	,,	,,	959	,,	975.
Hardicanute	,,	,,	1040	,,	1042.

2. Tell when Henry I., Richard I., Edward I., and Mary I. ascended the throne; and name their immediate successors.

			A.D.		
Henry I.	ascended	the throne	1100;	and was succ.	by Stephen.
Richard I.	,,	,,	1189;	,, ,,	John.
Edward I.	,,	,,	1272;	,, ,,	Edward II.
Mary I.	,,	,,	1553;	,, ,,	Elizabeth.

3. Write out a list of our sovereigns from William III. to William IV. inclusive, with their dates.

		A.D.
William III. / Mary II. died 1694,	began to reign	1689.
Anne	,, ,,	1702.
George I.	,, ,,	1714.
George II.	,, ,,	1727.
George III.	,, ,,	1760.
George IV.	,, ,,	1820.
William IV.	,, ,,	1830-1837.

Composition.

Write from dictation the passage given out by the Inspector.

Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Zuider See*.

Write, in small hand, as a specimen of copy-setting, *Have you prayed to-night, Desdemona?*

Music.

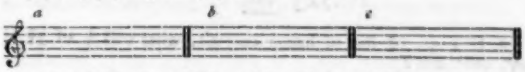
A quarter of an hour allowed for this paper.

1. What is meant by a *sound*, what by a *tone*; and how does a sound differ from a tone?

1. *Sound* is the effect on the ear of the vibration of the air caused by some disturbing force. When the vibration is regular the result is a *musical* sound.

A *tone* is the interval between two sounds, either higher or lower, and can be divided into two semitones.

2. What is a *triad*? Write in *a*, *b*, and *c* severally the triads of (C) Do, (F) Fa, and (G) Sol.



2. A *triad* is the addition of its third and fifth to any given note.

3. How many tones and how many semitones are found in the diatonic major scale, and what are the places in it of the latter?

3. Five tones and two semitones, the latter being found between the third and fourth, and seventh and eighth notes.

SECOND YEAR.

Pupil Teachers at end of Second Year.

Three hours and a half allowed.

Arithmetic.

MALES.

1. The population of the world may be taken at 1,456,000,000. Asia contains about 834,710,000 inhabitants; Europe, 315,950,000; Africa, 205,680,000; America, 95,410,000; the Pacific Islands, 4,125,000; and the Polar Regions, 82,000. Give the percentage of the population of the world belonging to each division, to 4 places of decimals.

$$\frac{1456{,}000{,}000}{100}\begin{cases} :: 834{,}710{,}000 : \frac{834710}{14560} = 57{\cdot}3289 \text{ p.c.} & \text{(Asia)} \\ :: 315{,}950{,}000 : \frac{315950}{14560} = 21{\cdot}6998 \text{ ,,} & \text{(Europe)} \\ :: 205{,}680{,}000 : \frac{205680}{14560} = 14{\cdot}0263 \text{ ,,} & \text{(Africa)} \\ :: 95{,}410{,}000 : \frac{95410}{14560} = 6{\cdot}5528 \text{ ,,} & \text{(America)} \\ :: 4{,}125{,}000 : \frac{4125}{14560} = {\cdot}2833 \text{ ,,} & \text{(Pacific Is.)} \\ :: 82{,}000 : \frac{82}{14560} = {\cdot}0056 \text{ ,,} & \text{(Polar Regions)} \end{cases}$$

2. What is the simple interest for 2 years on £120 5s. at 3½ per cent. per annum?

$$\text{Interest } \frac{£120\ 5s. \times 3\frac{1}{2} \times 2}{100} = \frac{£841\ 15s.}{100} = \underline{£8\ 8s.\ 4\tfrac{1}{2}d.}\ \text{Ans.}$$

3. If I pay 6 per cent. of 90 guineas for a ton of hay, what percentage of 100 guineas shall I pay for 9·75 tons?

1 ton cost $\frac{1}{9\frac{3}{4}}$ of 90 gui. or 5·4 gui.

$\therefore 9\frac{3}{4}$,, $\frac{5{\cdot}4 \times 39}{4}$ gui.

i.e., 52·65 gui. = $\underline{52\frac{13}{20}}$ p.c. of 100 gui.

4. If a dollar be worth 4·16 shillings, and a franc ·83 of a shilling, and a rupee 1·7916 shillings; what (*a*) decimal, and (*b*) percentage, of a florin is the value of each of those coins?

(*a*) dollar $= \frac{4{\cdot}1\dot{6}}{2} = \underline{2{\cdot}08\frac{1}{3}} =$ dec. of a florin; (*b*) $\frac{4{\cdot}1\dot{6} \times 100}{2} =$ $\underline{208{\cdot}\dot{3}}$ p.c.

(*a*) franc $= \frac{{\cdot}83}{2} = \underline{{\cdot}41\dot{6}} =$ dec. of a florin; (*b*) $\frac{{\cdot}83 \times 100}{2} =$ $\underline{41{\cdot}\dot{6}}$ p.c.

(*a*) rupee $= \frac{1{\cdot}7916}{2} = \underline{{\cdot}89583\frac{1}{3}} =$ dec. of a florin; (*b*) $\frac{1{\cdot}7916 \times 100}{2} =$ $\underline{89{\cdot}583\frac{1}{3}}$ p.c.

FEMALES.

1. Simplify $\frac{16\frac{1}{2} \text{ of } \frac{1}{19} \div 8\frac{1}{2} \text{ of } \frac{1}{4}}{1\frac{1}{4} \text{ of } 16\frac{1}{2} \div \frac{7}{19}}$

Multiplying dividend by $\frac{7}{7}$, and the divisor by $\frac{3}{3}$ we obtain

$$\frac{1392\times7}{696\times126} \div \frac{98\times3}{194\times7}$$

$$\left(\frac{1392}{696}\times\frac{7}{126}\right)\times\left(\frac{194}{98}\times\frac{7}{3}\right)=$$

$$\frac{2\times97}{18\times7\times3}=\frac{97}{189} \text{ Ans.}$$

2. If 1 qr. $6\frac{3}{4}$ lbs. of bacon cost £1, what will $\frac{1}{8}$ of $3\frac{3}{4}$ of $\frac{8}{11}$ cwts. cost?

1 qr. $6\frac{3}{4}$ lbs. = $34\frac{3}{4}$ lbs.

$\frac{1}{8}$ of $\frac{4}{11}$ of 20 lbs. = 25 lbs.

$34\frac{3}{4}$ lbs. : 25 lbs. :: £1 : cost required

$$\frac{£1\times25\times7}{240}=175\text{d.}=\underline{14\text{s. }7\text{d.}} \text{ Ans.}$$

3. Express the sum of $\frac{1}{3}$ of 7s. $4\frac{1}{2}$d., $\frac{1}{4}$ of 9s. $6\frac{3}{4}$d., and $\frac{1}{11}$ of £7 as the fraction of five and a half guineas.

	s.	d.
$\frac{1}{3}$ of 7s. $4\frac{1}{2}$d. =	2	$5\frac{1}{2}$
$\frac{1}{4}$ of 9s. $6\frac{3}{4}$d. =	4	$9\frac{3}{4}$
$\frac{1}{11}$ of £7 =	11	8
Total sum =	18	$10\frac{1}{4}$

$$\therefore \quad \underset{£5\ 15\text{s. }6\text{d.}}{18\text{s. }10\tfrac{1}{4}\text{d.}} = \underset{1386}{226\tfrac{1}{4}\text{d.}} = \underset{11088}{1815} = \underline{\underset{336}{55}} \text{ of } 5\tfrac{1}{2} \text{ gui. Ans.}$$

4. What will be the dividend, if the divisor be $89\frac{1}{12}$ and the quotient $735\frac{11}{17}$?

$$\text{dividend} = 89\tfrac{1}{12}\times735\tfrac{11}{17} = \frac{1069}{12}\times\frac{12506}{17} =$$

$$=\underline{65525\tfrac{16}{17}} \text{ Ans.}$$

Grammar.

1.

'Anon
We heard the lion roaring from his den;
We saw the large white stars rise one by one;
Or from the darkened glen
Saw God divide the light with flying flame,
And thunder on the everlasting hills.' —TENNYSON.

(*a*) What are co-ordinate sentences? Show that all the sentences in the above are co-ordinate sentences.

(*b*) Point out all the extensions of the predicate that occur in the above.

(*c*) Point out all the verbs in the infinitive mood that you notice in the above, and show why a verb in the infinitive mood cannot form the predicate of a sentence.

(*a*) Co-ordinate sentences are those which can be used independently of each other. The co-ordinate sentences in the above are, 1. 'Anon we heard the lion roaring from his den.' 2. 'We saw the large white stars rise one by one.' 3. 'From the darkened glen (we) saw God divide the light with flying flame.' 4. (We saw God) 'thunder on the everlasting hills.' These are co-ordinate sentences because each gives a complete thought independent of each other.

(*b*) The extensions of the predicate are:
'Anon' extending 'heard' (*time*)
'from the darkened glen' extending 'saw' (*place*)

(*c*) '*roaring*' = an infinitive, gov. by *heard*.
rise = ,, ,, ,, ,, *saw*.
divide = ,, ,, ,, ,, (*saw*).
thunder = ,, ,, ,, ,, ,,

Since the infinitive mood never takes a subject it cannot form a predicate. Sometimes, however, it asserts of an object as 'We saw *him go*.'

2. Conjunctions may be classified, as simplify collective, causal, adversative, or conditional. Give examples of each kind.

Collective conjunctions are :—			and, also, likewise, both . . . and
Causal	,,	,,	because, for, seeing that.
Adversative	,,	,,	but, however, yet, nevertheless, still.
Conditional	,,	,,	if, unless, except, since.

Geography.

Answer *either* Q. 2 *or* Q. 3, *not both*.

1. Draw a full map of that part of British North America which lies between Hudson's Bay and the Pacific Ocean.
Insert the lines of latitude and longitude.

2. Give full notes of a lesson on "The Life of a Settler in Australia," showing from the nature of the country what employments are likely to be open to him.

Employments open to Australian settlers.

1. ANIMALS.—Much of the soil adapted either for *agriculture* or for pasturing cattle and sheep—therefore all connected with farming, such as ploughmen, domestic servants, shepherds, etc., find ready employment. Wool is exported from Victoria, New South Wales, Western Australia, Queensland. The plains of the latter afford pasturage of the richest description, where countless numbers of horses, cattle, and sheep, roam in a half wild state. The principal occupation of the people in the various colonies are those of agriculture and stock-raising. Exporting cattle both dead and alive is a large branch of industry.

MINERALS.—Chief minerals are *gold* and copper.—Coal is also wrought: miners, therefore, find work in nearly all the colonies.—Gold is produced especially in Victoria; New South Wales, where coal is found in inexhaustible quantities.—In these two colonies mining operations give employment to a large fraction of the people.—Copper is found in Victoria, Western Australia, and Queensland, whence it is exported.

VEGETABLES.—South Australia—the granary of the Continent.—*Wheat* and *flour* of this colony being objects of just pride to the settlers.—*Cotton* of Queensland is considered superior to that from any other quarter of the world.—Culture of the *Vine* is a recognised branch of industry in South Australia.

Note.—Persons wanted are those who are willing to earn their bread by the sweat of their brow; labourers of all sorts, who can plough, sow, reap, and fence; artisans, such as carpenters, masons, smiths, brickmakers, wheelwrights, etc.; laundresses, dairymaids, etc.—which information should be drawn from the children after they have been made acquainted with the nature of the country.

SECOND PAPER.

Two hours and a half allowed.

History.

1. What can you tell about Northumbria, Mercia, and Wessex.

Northumbria, Mercia, and Wessex were the chief kingdoms of the Saxon Heptarchy about the year 670; and for a century and a half a continual struggle for supremacy was kept up between their respective kings. Northumbria went gradually to decay under the influence of seditions, usurpations, pestilence, and famine, which resulted in anarchy. Mercia then took the lead for about a century. The greatest of its kings was Offa; but the powerful rulers of Wessex were sometimes more than a match for the kings of Mercia, and finally Egbert, a great and wise monarch, in 827 marched into Mercia and compelled the Mercians to receive him as their lord. Northumbria also submitted, and all the rest of England, including Wales and Cornwall.

2. How did William, Duke of Normandy, come to be King of England?

It is said that Edward the Confessor had promised to make William his successor, and that Harold, William's rival, had sworn to give him his support. Resolving to make good his claim to the crown which Harold had usurped, he collected a mighty host, and built a great fleet to carry it across to England. He prevailed on the Pope to excommunicate Harold, and to send him a consecrated banner. Landing in Sussex, William met Harold and his army at Senlac, near Hastings. After a long and stubborn fight the Normans were victorious, and Harold, being slain, left William Conqueror. He was crowned King on Christmas Day, 1066.

3. Who were the Lollards? What treatment did they receive from Henry IV. and Henry V.?

The Lollards were those who followed the religious doctrines of Wiclif. During the reign of Henry IV. a Statute, called *De hæretico comburendo*, was passed which aimed at the Lollards,

and enacted that all heretics refusing to give up their opinions should be delivered over to the civil authorities to be burned alive. A London clergyman named Sawtre was the first to suffer in 1401. Henry V. followed the cruel policy of his father in his treatment of heretical opinions. In his reign Lord Cobham, leader of the Lollards, having, it is said, used threats against the civil powers, was condemned to be burnt. Cobham escaped, and a rising of his followers was crushed. Many were executed as traitors, and Cobham, having again escaped, was seized four years after in Wales, condemned at once by Parliament, and burned.

Composition.

Write full notes of a lesson on *Wheat*.

OBJECTS TO BE SEEN.—Stalk of wheat bearing its ear of seeds—chaff—wheat grains free from chaff—bran—flour—biscuit—or other bread made from flour.

CULTIVATION OF PLANT.—Ploughing—sowing in Spring or Autumn—harrowing—rolling—first appearance of plant—ripe in about seven months after the wheat begins to grow—cutting of plants by scythe—sickle—machine—sheaves collected—and piled with head upwards till thoroughly dry—stacked and kept till required for use.

MANUFACTURE OF WHEAT INTO FLOUR.—Wheat threshed by a flail (*describe*)—or in mills—to separate grain from ear—and shake off husk or *chaff*—grain and chaff *winnowed* (*describe*)—steam power often used for the foregoing purposes—Wheat now taken to mill and ground between two large stones (*describe*)—grain when put in covered with a skin—which comes off unground and called *bran*—bran and flour mixed are whole-meal—bran when sifted leaves flour much whiter—flour made finer and finer by sifting—(*sieves described*).

USES.—Very important article of food—made into many kinds of bread—(*ask for names from class*)—starch—*bran* for feeding horses, cows, etc.—bran and flour make *brown-bread*—straw used for bedding, mattresses, thatching, etc.—chaff also used for same purposes.

WHERE GROWN.—England—Russia—France—United States—New South Wales has the best in the world—Prussia—Egypt—and in most temperate regions—imported in great quantities from various countries to supplement the British Crop.

Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Zuider Zee*.

Write, in small hand, as a specimen of copy-setting, *Have you prayed to-night, Desdemona?*

Euclid.

MALES.

[All generally understood abbreviations for *words* may be used.]

1. Define *point, superficies, plane angle, figure, square, parallelogram, theorem.*

A *point* is that which has position but no parts or magnitude.

A *superficies* is that which has only length and breadth.

A *plane angle* is the inclination of two lines to one another in a plane which meet together, but are not in the same direction.

A *figure* is that which is enclosed by one or more boundaries.

A *square* is a four-sided figure having all its sides equal, and all its angles right angles.

A *parallelogram* is a four-sided figure whose opposite sides are parallel.

A *theorem* is a proposition in which some geometrical property has to be demonstrated; props. IV. V. VI. etc., of Bk. I. are theorems.

2. To bisect a given rectilineal angle, that is, to divide it into two equal angles. Why is the equilateral triangle described remote from the vertex?

Prop. IX. Bk. I.

The equilateral triangle is to be described *remote* from the vertex, because if described on the *same* side, its vertex might coincide with the vertex of the given angle and then the construction would fail.

3. If two triangles have two angles of the one equal to two angles of the other, each to each, and one side equal to one side, viz., either the sides adjacent to the equal angles in each, or the sides opposite to them; then shall the other sides be equal, each to each, and also the third angle of the one equal to the third angle of the other.

Prop. XXVI. Bk. I.

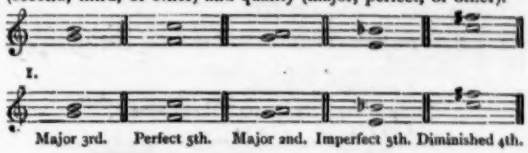
Needlework.

One hour allowed for this exercise.

Music.

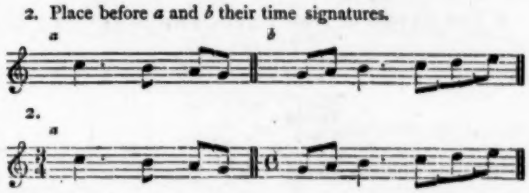
A quarter of an hour allowed for this paper.

1. Write under each of the following intervals its name (second, third, or other) and quality (major, perfect, or other).



Major 3rd. Perfect 5th. Major 2nd. Imperfect 5th. Diminished 4th.

2. Place before *a* and *b* their time signatures.



3. Write in *a* the scale signature of E♭ (*Mi*), in *b* that of A (*La*), in *c* that of G (*Sol*), and in *d* that of F (*Fa*).

THIRD YEAR.

Pupil Teachers at end of Third Year, *if apprenticed on, or after,* **1st May, 1878; and Pupil Teachers at end of Fourth Year,** *if apprenticed before that date.*

Three hours and a half allowed.

Arithmetic.

MALES.

1. 650 children are examined in a school, of whom 28 per cent. fail in arithmetic, 16 per cent in writing, and 12 per cent. in reading. How many children *pass* in each subject?

(*a*) $\frac{72}{100}$ of 650 $= \frac{650 \times 72}{100} = \underline{468}$ pass in Arithmetic.

(*b*) $\frac{86}{100}$ of 650 $= \frac{650 \times 86}{100} = \underline{559}$ „ Writing.

(*c*) $\frac{88}{100}$ of 650 $= \frac{650 \times 88}{100} = \underline{572}$ „ Reading.

2. What principal should be put out at 3½ per cent. simple interest for 5 years in order to produce an amount of £173 18s.?

Amount of £100 for 5 years at 3½ p.c. = £117½

∴ £117½ : £173 18s. :: £100 : principal required.

$$\frac{£100 \times 3478}{2351} = \underline{£148}. \quad \text{Ans.}$$

3. A merchant bought wines at 30s., 40s., and 50s. per dozen. These he mixed in the proportion of 5, 4, and 3, and sold the mixture at 57s. 6d. per dozen. What was his gain per cent.?

	s.	s.
5 doz.	@ 30	= 150
4 „	@ 40	= 160
3 „	@ 50	= 150
∴ the 12 doz.		= 460

and prime cost of 1 doz. = 38s. 4d. which being sold for 57s. 6s. gives a profit of 19s. 2d. or 33⅓ p.c. Ans.

Note.—19s. 2d. = ⅓ of 57s. 6d

4. Which is the best offer, and by how much, in exchange for a horse,—5 cwt. 1 qr. 23 lbs. of an article worth 7½d. per lb., or ½ per cent. on a contract of £16,000?

	£	s.	d.
(*a*) £16,000 @ ½ p.c. = ½ of £160	= 20	0	0
(*b*) 5 cwt. 1 qr. 23 lbs. @ 7½ per lb. = 611 @ 7½d. =	19	1	10½
(*a*) is better than (*b*) by	18	1	1½

FEMALES.

1. Reduce 7 minutes to the decimal of a day, and divide £10 11s. 3d. by 29·25.

(*a*) $\frac{7 \text{ minutes}}{24 \text{ hours}} = \frac{7 \text{ min.}}{144 \text{ min.}} = \underline{\cdot 004861}$. Ans.

(*b*) $\frac{£10\ 11s.\ 3d.}{29{\cdot}25} = \frac{£42\ 5s.}{118} = \frac{845}{118}s. = \underline{7s.\ 2\frac{3}{59}d.}$ Ans.

2. Find the value of ·76809 of 3 mls. 4 fur.

·76809
3½
384045
230427
2·688315 mls.
8
5·50652 fur.
40
20·2608 po.

2 mls. 5 fur. 20½ po. Ans.

3. Find the cost of 3 hhds. of sugar, each weighing 11 cwt. 3 qrs. 10·12 lbs., at the rate of 72·76 shillings foe 1·6 cwt.

(*a*) 11 cwt. 3 qr. 10·12 lbs. × 3 = 1326·12 lbs. × 3 = 3978·36 lbs.
(*b*) 1·6 cwt. = 179·2 lbs.
(*c*) 179·2 : 3978·36 :: 72·76s. : cost required.

$\frac{72{\cdot}76s. \times 3978{\cdot}36}{179{\cdot}2} = \frac{\cdot 289465{\cdot}4736}{179{\cdot}2} =$

1615·32 + s. = £80 15. 3·8d. Ans.

4. Simplify—

$$\frac{2{\cdot}048 \times {\cdot}072}{{\cdot}64 \times {\cdot}0009} \times \frac{54{\cdot}045 \times 12}{81 \times {\cdot}036}$$

$$\frac{2{\cdot}048}{{\cdot}04} \times \frac{{\cdot}072}{{\cdot}036} \times \frac{54{\cdot}045}{{\cdot}0009} \times \frac{12}{81} =$$

$$3{\cdot}2 \times 2 \times 60050 \times \frac{4}{2{\cdot}7} =$$

$$\frac{15372800}{27} = \underline{569362{\cdot}\dot{9}\dot{6}2}.$$ Ans.

Grammar.

1. 'Now, my co-mates, and brothers in exile,
Hath not old custom made this life more sweet
Than that of painted pomp? are not these woods
More free from peril than the envious court?'

SHAKESPEARE.

(*a*) Analyze the last sentence in the above.
(*b*) Parse all the words in the second and third lines of the above.

(*a*)
- 'woods' ... ... *subject.*
- 'these' ... ... *enlargement of subject.*
- 'are not' ... ... } *incomplete predicate.*
- 'more free from peril' } *completion of predicate.*
- 'than the envious court (is free)' ... ... *adv. clause (of comparison) to predicate.*

(*b*) *Hath*—aux. verb 3rd pers. sing. forming with *made*—pres. perf. indic. of irreg. verb *make, made, made*, agr. with subj. *custom.*
not—adv. of negation mod. *hath made.*
old—adj. pos. deg. qual. *custom.*
custom—abstr. noun, neut. sing., nom. to *hath.*
this—demonstr. adj. pointing to *life.*
life—abstr. noun neut. sing. obj. gov. by *made.*
more—adv. of deg. mod. *sweet*, forming compar. deg.
sweet—predicative adj. qual. *life.*
than—subord. compar. conj. introducing sub'rd. clause.
that—demonstr. pron. referring to *life*, neut. sing. nom. to (is).
of—prep. gov. obj. case *pomp.*
are—irreg. subst. verb. *am, was, been*, indic. pres. indef. 3rd pers. plur. agr. with *woods.*
not—adv. of negation mod. *are.*
these—demonstr. adj. pointing to *woods.*
woods—com. noun, neut. plur. nom. to *are.*

2. Give an example of—

(*a*) A simple sentence.
(*b*) A complex sentence containing a principal and an adjective sentence.
(*c*) A complex sentence containing a principal and an adverbial sentence.
(*a*) I have written a simple sentence.
(*b*) The sentence that is here written is a complex sentence.
(*c*) Can you analyze a complex sentence when you meet one?

3. Write out five words, each compounded of one of the following Latin prepositions, ex, sub, super, trans.

(*a*) *ex*tract, *ef*fect, *e*duce, *e*ccentric, *e*scape.
(*b*) *sub*tract, *suf*fer, *sus*pect, *suc*ceed, *sur*rogate.
(*c*) *super*intend, *sur*face, *super*ior, *sur*tout, *sir*loin.
(*d*) *trans*late, *tra*ject, *tres*pass, *trans*it, *traf*fic.

Geography.

1. Draw a full map of the coast-line, from Singapore to the northern end of the Sea of Japan, including the islands near the coast. Insert the lines of latitude and longitude.

2. Give full notes of a lesson on 'A Voyage from Cape Town to Suez and Brindisi,' followed by a railway journey from Brindisi to Paris and Dieppe.

APPARATUS.—Maps of Africa, and Europe or better, a sketch of the voyage made on blackboard as the lesson is given.

ROUTE TO SUEZ.—Starting from Cape Town, capital of Cape Colony, steam or sail N.E. with no good port of refuge in case of storm till we reach the magnificent natural harbour of Delagoa Bay—past Cape Corrientes, Sofala Bay—through the channel of Mozambique with whose southwest current we have to contend—along the low coast of Zanzibar—and the wild and desert coast of the Gallas and Somali to Cape Guardafui, the most eastern point of Africa. Our course is westward to Aden in the Straits of Bab-el-mandeb, the entrance to the Red Sea—whose coasts present nothing but precipitous gulleys, barren sands, and inaccessible cliffs. In passing up the Red Sea we have Arabia on the right and Abyssinia, Nubia, and Egypt on the left—observe the peninsula of Sinai before we arrive at Suez our first destination.

SUEZ TO BRINDISI.—Resuming our voyage at Suez, the entrance to the 'Canal' on the south we are safely floated for 100 miles to Port Said at the northern or Mediterranean entrance—continue in a north-westerly course through the Mediterranean to the Adriatic and reach Brindisi on the east coast of Italy.

On this part of the voyage reference may be made to the 'Canal,' Egypt, Alexandria, Cairo, the Pyramids, and the Nile, to Cyprus, and the general character of the Mediterranean.

Brindisi to Paris and Dieppe.—Having reached Brindisi our journey is continued by rail along the coast of the Adriatic to Ancona, a steamboat-station—thence to Turin, via Bologna, Modena, Parma, and Milan. *Remarks to be made on the view of the sea from the carriage and the towns passed.*

Between Turin and Chambery we pass through the Mont Cenis Tunnel (*here to be described*). Leaving Italy we cross the whole breadth of France, past Lyons to Paris (*description*), and thence to Dieppe viâ Rouen. From Dieppe the passage may very pleasantly be made to Newhaven.

SECOND PAPER.

History.

Two hours and a half allowed.

1. Who was Lady Jane Grey? Tell her married name and examine her claim to the crown.

1. Lady Jane Grey was the great grand-daughter of Henry VII. and the daughter of the Duke of Suffolk.

Her married name was Lady Guildford Dudley. Edward VI. bequeathed to her the crown, but Mary, the daughter of Henry VIII. was the rightful heir.

2. How was the succession settled at the death of Elizabeth? Give the date of that event and the length of her reign.

At the death of Elizabeth the crown went to James VI. of Scotland, whose great grandmother (Margaret) was the eldest daughter of Henry VII.

This took place in 1603, after Elizabeth had reigned 44 years.

3. What was the Darien Scheme? Explain the Scotch 'Act of Security,' to which its failure gave rise.

During the greater part of the reign of William III., the Scotch complained of the way in which the English Parliament hampered Scottish trade, and as one means of pacifying Scotland, the King's Commissioner to the Parliament offered to promote emigration. William Paterson, who founded the Bank of England, started *the Darien scheme* for the colonization of Panama. It however resulted in wide-spread ruin on account of the jealousy of the English and Dutch trading companies. An 'Act of Security,' was passed in the Scotch Parliament providing that if Anne died childless the same sovereign should not be chosen to rule over Scotland and England unless the commercial equality of the two kingdoms were secured.

Penmanship.

Write in large hand, as a specimen of copy-setting, the word *Zuider Zee.*

Write in small hand, as a specimen of copy-setting, '*Have you prayed to-night, Desdemona?*'

Composition.

Write from memory the substance of the passage read to you by the Inspector.

Euclid.

MALES.

[All generally understood abbreviations for *words* may be used.]

1. Parallelograms upon the same base, and between the same parallels, are equal to one another.

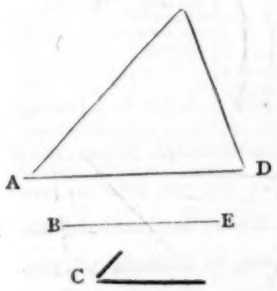
Prop. XXXV., Bk. I.

2. To describe a parallelogram equal to a given rectilineal figure, and having an angle equal to a given rectilineal angle.

Prop. XLII., Bk. I.

3. Construct a triangle having given two sides and an angle opposite one of them; and show that there may, according to circumstances, be two solutions, one or none.

3. Let AD, and BE, be the two given sides and C an angle opposite to one of them, and since C may be either opposite to the less or the greater of the two sides there will be two solutions. First take C to be opposite the less BE.



Make at the point A in AD an angle DAF equal to C (I. 23), and from D with the distance BE, draw a circle cutting AF in F. (*If DF be not long enough to cut AF then the solution fails.*) The triangle AFD is the triangle required.

(A similar construction solves the problem if the angle C be taken opposite the greater side AD.)

Because DF = BE, and the angle DAF was made equal to the given angle C then DAF is the triangle required.

Note.—Of course there is only one solution when it is specified to which side the given angle is opposite.

Algebra.

MALES.

Answer Q. 3, and either Q. 1 or Q. 2.

1. Show that $(5a-x)^3-(a-5x)^3=4(a+x)\{31(a-x)^2+16ax\}$.

(*a*) $\{(5a)^3-3(5a)^2x+3(5a)x^2-x^3\}-\{a^3-3a^2(5x)+3a(5x)^2-(5x)^3\}=$
$(125a^3-75a^2x+15ax^2-x^3)-(a^3-15a^2x+75ax^2-125x^3)=$
$124a^3-60a^2x-60ax^2+124x^3=$ value of left side.

(*b*) $4(a+x)\{31(a-x)^2+16\}=4(a+x)\{31a^2-62ax+31x^2+16ax\}$
$=(4a+4x)(31a^2-46ax+31x^2)$
$=124a^3-184a^2x+124ax^2+124a^2x-184ax^2+124x^3$
$=124a^3-60a^2x-60ax^2+124x^3$
$=$ val. of right side.

$\therefore$ each side $=124a^3-60a^2x-60ax^2+124x^3$.

2. Find the G. C. M. of—
$6a^4b-17a^3b^2+14a^2b^3-3ab^4$ and $2a^4+3a^3b-9a^2b^3$.

Eliminating ab from the first, and a^2 from the second, we have
$6a^3-17a^2b+14ab^2-3b^3$ and $2a^2+3ab-9b^2$

$2a^2+3ab-9b^2)\ 6a^3-17a^2b+14ab^2-3b^3\ (3a-13b$
$6a^3+9a^2b-27ab^2$
$-26a^2b+41ab^2-3b^3$
$-26a^2b-39ab^2+117b^3$
$80b\ /\ 80ab^2-120b^3$
$2a-3b)\ 2a^2+3ab-9b^2\ (a+3b$
$2a^2+3ab-9b^2$

$\therefore a(2a-3b)=2a^2-3ab$ is the G. C. M. (a being a measure of ab and a^2).

3. Solve the equations:—
1. $x(x-5)+3(1-x^2)=8-2x^2$.
2. $\frac{x-1\frac{1}{2}}{2}-\frac{2-6x}{13}=x-\frac{5x-\frac{1}{2}(10-3x)}{39}$

Explain, as to a class, each step in the solution of 1.

1. $x(x-5)+3(1-x^2)=8-2x^2$

Multiply x into $x-5$ and 3 into $1-x^2$ to clear away brackets, then $x^2-5x+3-3x^2=8-2x^2$

Now since '*equal quantities may be added or subtracted from equal quantities without destroying the equality of the sums or remainders,*' then '*any quantity may be transferred from one side to the other without affecting the result, the sign of such quantity being changed.*'

therefore $x^2-3x^2+2x^2-5x=8-3$

collecting the quantities $-5x=5$

Now '*if equal quantities be multiplied or divided by equal quantities, the products or quotients shall be equal.*

therefore dividing each side by -5 we obtain $x=-1$. Ans.

2. Multiply each side by 156

$78x-153-24+72x=156x-20x+10-3x$

$78x+72x-156x+20x+3x=153+24+10$

$173x-156x=187$

$17x=187$

$x=11$. Ans.

Needlework.

FEMALES.

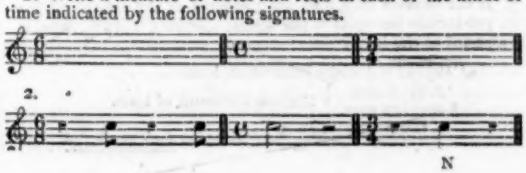
One hour allowed for this Exercise

Music.

A quarter of an hour allowed for this Paper.

1. Which of the following chords are major and which minor?

2. Write a measure of notes and rests in each of the kinds of time indicated by the following signatures.



3. Write over each of the following the name of the major scale, and under each that of the minor scale, of which it is the signature.

FOURTH YEAR.

Pupil Teachers at end of Fourth Year, *if apprenticed on, or after, 1st May,* 1878; **and Pupil Teachers at end of Fifth Year,** *if apprenticed before that date.*

Three hours and a half allowed.

Arithmetic.

MALES.

1. A speculator investing in the 3½ per cents. obtains 4 per cent. for his money after paying ¼ per cent. for brokerage. At what rate does he buy in?

4 : 3¼ :: 100 : price of stock.

$\frac{£100 \times 13}{4 \times 4} = 81\frac{1}{4}$

$81\frac{1}{4} - \frac{1}{4} = \underline{81}$ price to the speculator.

2. What is the average rate of interest per cent. per annum in the following 4 investments:—£50 yielding £2 10s. in six months, £95 yielding £2 7s. 6d. in 3 months, £1100 yielding £45 7s. 6d. in 12 months, and £200 yielding 6 guineas in 9 months?

	£		£				£	£	
If	50	yields	2·5	in	6 mos.,	then	100	yields	10 in a year.
,,	95	,,	2·375	,,	3 ,,	,,	,,	10	,,
,,	1100	,,	45·375	,,	12 ,,	,,	,,	4·125	,,
,,	200	,,	6·3	,,	9 ,,	,,	,,	4·2	,,

i.e., £400 at the various rates yield 28·325 ,,

∴ £100 yields $\underline{7\frac{1}{13}}$,, Ans.

3. £10,000 in 3½ per cents. is left, free of legacy duty, to an almshouse for the support of 13 bedesmen. This sum is sold out and reinvested in 4 per cents. at par, legacy duty and transfer expenses amounting to 11¼ per cent. The bedesmen, when the arrangements are completed, receive each £25 2s. $5\frac{7}{13}$d. a year. What was the selling price of the 3½ per cents.?

(*a*) £25 2s. $5\frac{7}{13}$d. × 13 = £326·6 = interest from new investment.
(*b*) £100 brings 4 ∴ £326·6 is got from $\frac{326·6 \times 100}{4}$ = £8165 sum invested in 4 per cents.
(*c*) On account of expenses, etc., 88¾ is left from £100 for re-investment.

∴ Selling price of the 3½ per cents. = $£\frac{8165}{100} \times \frac{100}{88\frac{3}{4}}$ =

£8165 × $\frac{4}{355}$ = £92. Ans.

4. If gold can be beaten out so thin that a grain of the metal will form a leaf of 56 square inches, how many of these leaves laid one upon the other would make a block one inch thick, the weight of a cubic inch of gold being 10 oz.?

When finished the block = 56 cubic. inch.
,, ,, = 56 times 10 oz.
,, ,, = (56 × 10 × 480) grains.
,, ,, = 268,800 grs. = No. of leaves.

5. If the interest on a loan for 5 months at the rate of 3½ per cent. per annum be equal to the square root of £·167281, what is the amount of the loan?

$\sqrt{·167281} = £·409$ = interest on loan.

£3¾ : £·409
5 mos : 12 mos. } :: £100 : amount of loan.

$\frac{£100 \times ·409 \times 12 \times 4}{15 \times 5} = £26·176 = \underline{£26\ 3s.\ 6\frac{4}{15}d.}$

FEMALES.

1. From what principal did £273 15s. arise in a year at 4½ per cent.?

£4½ : £273¾ :: £100 : principal sought.

$£100 \times \frac{1095}{18} = \underline{£6083\ 6s.\ 8d.}$

2. A man divides £1280 among his three children, so that their portions are as 5, 3, 2 respectively. How much does each receive?

5 + 3 + 2 = 10 ∴ the shares are $\frac{5}{10}$, $\frac{3}{10}$, $\frac{2}{10}$ of £1280 =

£640; £384; and £256. Ans.

3. A man invests £2340, and makes £2587 of it. What does he gain per cent.?

£2340 gains (£2587 − £2340) = £247

∴ £2340 : £100 :: £247 : gain p. c.

$\frac{£247 \times 100}{2340} = £\frac{95}{9} = \underline{10\frac{5}{9}}$. Ans.

4. How much stock in the 4 per cents. can be purchased for £1240 when the price is 89¾?

89¾ : £1240 : £100 : stock required.

$\frac{£100 \times 1240 \times 4}{359} = £\frac{496000}{359} = \underline{£1381\ 12s.\ 3\frac{313}{359}d.}$ Ans.

Grammar.

1. 'I know a counsellor and secretary, *that* never came to Queen Elizabeth of England with bills to sign, but he would always first *put* her into some discourse of state, *that she might the less mind the bills.*' —BACON'S ESSAY ON CUNNING.

(*a*) Analyze the above, taking care to show the character of each sentence.
(*b*) Parse the words in italics.
(*c*) Make a short sentence, in the style of the present day, in which the word *but* shall be used in the same manner as in the above.

(*a*)

Sentences.	Kind.	Subject.	Predicate.	Object.	Extensions.
(1) I know a counsellor and secretary	Principal	I	know	a counsellor and secretary	
(2) that never came to Queen Elizabeth with bills to sign,	Adjective to 'secretary'	that	came		to Queen Elizabeth of England *(place)* never *(time)* with bills to sign *(accomp. circumstances)*
(3) but he would always first put her into some discourse of state,	Adv. of *condition* to 'came'	(but) he	would put	her (direct) into some discourse of state *(complement)*	always first *(time)*
(4) that she might the less mind the bills.	Adv. of *purpose* to (3)	(that) she	might mind	the bill	the less *(degree)*

(*b*) *that*—simple rel. referring to 'secretary,' 3rd pers., sing., mas., nom. to *came;*
put—trans. verb, irreg. *put, put, put,* infinitive, pres. indef. gov. by *would.*
that—conj. of purpose (= in order that) introducing subord. adv. sentence.
she—personal pron., referring to Elizabeth, 3rd pers. sing. fem. nom. to *might.*
might—aux. verb, defect. *may, might,* forming the infin.
find—of irreg. trans. verb, *find, found found,* subj. past indef., 3rd pers. sing. agreeing with *she.*
the—the A. S. instrumental inflexion used before comparatives.
the less—adv. phrase of deg. mod. *might mind.*
the—def. art. or disting. adj. pointing to *bills.*
bills—com. noun, neut. plur., obj. gov. by *mind.*
(*c*) He never appears, but quarrels follow.

2. What class of English verbs are all of Saxon origin?

(1) *Auxiliary* verbs and (2) all verbs of the *strong* or *irregular* conjugation:—as (1) *may, might; can, could; shall, should;* (2) *put, put, put; leave, left, left; see, saw, seen.*

3. Give some account of the derivation of the verbs *defend*, *accept*, and *baptize*; and mention, if you can, other verbs of the same kind.

Defend is derived from the Latin *de*, from, and *fendere*, to keep off; *accept* from L. *ad* to, and *ceptum*, received; others of the same kind are—*impose*, *refer*, *accede*, *profess*.

Baptize is derived from Gr. *baptizo*, I make to dip; others are *economize*, *paralyze*, *stigmatize*, *climatize*.

Geography.

1. Draw a full map of that part of British North America and the United States which lies to the west of the 90th meridian of West Longitude. Insert the lines of latitude and longitude.

N.B.—The 90th meridian passes through the mouths of the Mississippi.

2. Give full notes of a lesson on 'The Atlantic Ocean.'

THE ATLANTIC OCEAN.

Apparatus.—A map of the Atlantic, or a sketch on black-board to be filled in as the lesson proceeds.

I. SHAPE, BOUNDARIES, AND EXTENT.—Canal-shaped—sometimes called 'Atlantic Canal'—sides nearly parallel—projections on one side standing opposite indentation on the other—about 1,000 miles long—separates Old World on east from the New on the west—connects Arctic with the Antarctic—breadth varies from 900 miles between Norway and Greenland to over 4,000—area, more than 35 million square miles—divided into North and South Atlantic. Average depth about 2,500 fathoms.

II. ISLANDS.—Distinguished from all the other oceans by the fewness of its islands. Principal groups on E. side of N. Atlantic:—Gt. Britain and Ireland, Faroe Is., Channel Is., Canary, Madeira, and C. Verd Is., Azores, Is. in Gulf of Guinea. On W. side:—Newfoundland, Cape Breton I., and Prince Edward's I., Bermudas, Bahamas, and West India Is.—S. Atlantic remarkably free from islands. On E. side are none of any importance—in open ocean are St. Helena, Ascension, and Tristan d' Acunha. On W. side—Falkland Is., opposite S. extremity of S. America, which extremity consists of a cluster of islands called Tierra del Fuego.

III. BRANCHES.—Baltic, North Sea, Irish Sea, English Channel, Bay of Biscay, Mediterranean, G. of Guinea, on the east side; Hudson Bay, G. of St. Lawrence, G. of Mexico, Caribbean Sea, on the west.

IV. RIVER SYSTEMS.—Principal rivers from Old World:—Rhine, Loire, Tagus, Rhone, Po, Danube, and Don; Nile, Senegal, Niger, Congo, Orange. From New World:—St. Lawrence, Mississippi, Rio Grande del Norte; the Orinoco, Amazon, and Rio de la Plata.

V. CURRENTS.—Equatorial current flowing from coast of South Africa to the Caribbean Sea—celebrated Gulf Stream—leaves Gulf of Mexico, flows through Straits of Florida, and runs 3,000 miles northwards, and has an effect even on the climate of Britain (*the value of this remarkable current to be explained*)—*Grassy Sea* is caused by the nearly stagnant water in centre of the revolving current.

VI. WINDS.—Trade-winds blow regularly in the tropical region—beyond the limits of Tropics winds are variable.

Note.—Mention might be made of the Telegraph Cables connecting Europe and America, with remarks on the general character of the configuration of the bed of the Atlantic.

SECOND PAPER.

Two hours and a half allowed.

History.

1. What do you understand by a 'disputed succession'? Mention instances since the Norman Conquest, with their dates, and explain the effects upon the people.

When two or more claimants for the throne appear, and head parties strong enough to support their claims, the succession is said to be disputed.

For example, Henry I. seized the English crown on the death of Rufus (1100) during the absence of his brother Robert, who had the strongest claim. However, Henry was allowed to keep the throne by pleasing the mass of the people. For this purpose he promised that some of the old English laws should be restored, that the barons should be bound to do justice to their dependents, and that the church should no longer be plundered by the king. His wars with his brother Robert, and the conquest of Normandy, caused the Normans of England to regard themselves more and more as English, and to look on the Normans of Normandy as foreigners.

In 1135 the succession was disputed by Stephen, grandson of the Conqueror, and Matilda, daughter of Henry I. Stephen became king, and during the whole of his reign, although he meant well, had no power, except over his army, and could hardly be said to govern at all; justice was totally neglected; his reign was a time of universal confusion, fighting, plundering, starvation, and misery indescribable.

2. When were the supplies voted by Parliament first appropriated to particular purposes? Show the importance of this change.

In the reign of Charles II. 1665, the House of Commons voted a sum of money on the condition that it should be spent in carrying on the Dutch war, and for no other purpose. Suspecting that Charles, notwithstanding this proviso, had not spent the money as had been directed, the Commons instituted an inquiry, which resulted in the discovery of great abuse of trust and misapplication of funds. The result of this experience was a more jealous watchfulness on the part of the Commons over the national expenditure, which has gradually developed into the system of the present day, in accordance with which every penny is voted for a certain purpose, and for no other.

3. When did George IV. ascend the throne? Account for the national distress which marked the early years of his reign.

George IV. ascended the throne in 1820. The national distress at the beginning of his reign was caused by the restrictions placed upon trade, as well as by the heavy taxation consequent upon the long European War. The scarcity caused by a series of bad harvests was intensified by the landowners, who kept their corn till it had reached famine prices. Society was also disturbed by the great changes of employment after the war, the riots against machinery by the Luddites, and the distress of the rural poor, which brought about a rapid increase of crime.

Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Zuider Zee*.

Write, in small hand, as a specimen of copy-setting, '*Have you prayed to-night, Desdemona?*'

Composition.

Write a short essay on *Different modes of artificial lighting*.

In this country, when the short winter day is cheered by only a few hours of the sun, it is an absolute necessity to have some means of lengthening the working day by artificial methods.

In cities, towns, and even in many villages, this is effected by gas, manufactured from coal. Some of the wealthier cities have recently been experimenting with the electric light, and it is generally expected that it will soon be as much used as coal-gas is now. The lime-light is also made use of in theatres when some particular actor or scene has to be prominently brought out.

In country places, where gas is impracticable, oils of various qualities are burned in lamps, which is a great improvement on the more ancient method of lighting with candles. These are still preferred for cleanliness and safety in many houses, very beautiful ones being manufactured in wax, and a very pretty sight it is to see a room when the light is emitted from a series of handsome candelabra.

It is a usual thing to celebrate some important events, or escort a notable person with a torch-light procession, reminding one of the time when the link-boys expected some remuneration after accompanying a lady or gentleman through the streets of London, in the days when the city could neither boast of oil nor gas.

What a blessing is the lighthouse, with its guiding light to the mariner, when the natural day is ended, and the never-failing beacon warns him of danger, or proclaims to him a haven of refuge!

Euclid.

MALES.

Answer two Questions, including (if possible) Q. 2.

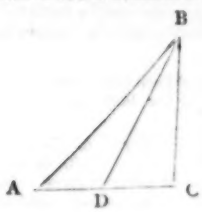
[All generally understood abbreviations for *words* may be used]

1. If a straight line be divided into two equal parts, and also into two unequal parts; the rectangle contained by the unequal parts, together with the square on the line between the points of section, is equal to the square on half the line.

Prop. V., Bk. II.

2. If a line be drawn from one of the acute angles of a right angled triangle to the bisection of the opposite side, the square on that line is less than the square on the hypothenuse by three times the square on half the line bisected.

Let AC be bisected in D, and join BD, then the sq. on AB is equal to the sq. on BD and three times the sq. on AD (or DC).



Because AC is bisected in D the sq. on AC is obviously equal to four times the sq. on AD or DC, in other words to *three* times the sq. on AD and the sq. on DC.

Now sq. on AB = sqs. on BC, CA (I. 47) that is to the sq. on BC, the sq. on DC, and three times the sq. on AD.

But sq. on BD = sqs. on BC and CD.

Therefore sq. on AB = sq. on BD and three times the sq. on AD or DC.

That is the sq. on D is less than the sq. on AB by three times the sq. on half the line bisected. Q. E. D.

3. If a straight line be bisected, and produced to any point, the square on the whole line thus produced, and the square of the part of it produced, are together double of the square on half the line bisected, and of the square on the line made up on the half and the part produced.

Prop. X. Bk. II.

Algebra.

MALES.

Answer two Questions, including (if possible) Q. 1.

1. If c be a common measure of a and b, it will also measure $ma+nb$ and $ma-nb$, where m, n are any quantities.

Prove that in the ordinary process for finding G. C. M., the result is not affected if at any step we multiply the dividend by a simple factor.

Let c be contained p times in a, and q times in b; then $a=pc$, $b=qc$, and $ma\pm nb=mpc\pm nqc=(mp\pm nq)\,c$; hence c is contained $mp\pm q$ times in $ma\pm nb$, and therefore c measures $am\pm nb$.

To avoid fractional co-efficients in all the terms which occur, we may, without altering the G. C. M. of the expression, multiply by any quantity which does not introduce a new common measure; for the greatest common measure of mD and nD, if m and n have no common measure but unity, is D; and D will also be the Greatest Common Measure of mD and pnD, if p and m have no common measure but unity.

2. Simplify—

$$
\begin{aligned}
&(1\quad 5(a+b)^3-5(a-b)^3-20ab(a-b)-10b(a+b)^2.\\
&5(a^3+3a^2b+3ab^2+b^3) = \quad 5a^3+15a^2b+15ab^2+5b^3\\
&-5(a-b)^3 = \quad -5a^3+15a^2b-15ab^2-5b^3\\
&-20ab(a-b) = \quad -20a^2b+20ab^2\\
&-10b(a+b)^2 = \quad -10a^2b-20ab^2-10b^3\\
&\text{adding} = \quad \underline{10b^3} \text{ Ans.}
\end{aligned}
$$

$$
\begin{aligned}
&(2)\ \frac{1}{9x^2-4y^2}-\frac{3x}{27x^3-8y^3}\\
&\text{L. C. M.}=(3x-2y)(3x+2y)(9x^2+6xy+4y^2)\\
&\frac{9x^2+6xy+4y^2-9x^2+6xy}{(3x-2y)(3x+2y)(9x^2+6xy+4y^2)}=\\
&\frac{12xy+4y^2}{(3x+2y)(27x^3-8y^3)}=\\
&\frac{4y(3x+y)}{81x^4-24xy^3-54x^2y-16y^4} \text{ Ans.}
\end{aligned}
$$

3. Solve the equations—

$$
\begin{aligned}
&(1)\ \begin{cases}101x-400y=2\\ 101y-25x=\frac{1}{4}\end{cases}\\
&101x-400y=2 = \quad 101x-400y=2\\
&-25x+101y=\tfrac{1}{4} = \quad -100x+404y=2\\
&\text{adding} \quad\quad x+4y=4\\
&\quad\quad\quad\quad x=4-4y
\end{aligned}
$$

Substituting for x in No. 1.

$$
\begin{aligned}
&404-404y-400y=2\\
&804y=402\\
&y=\tfrac{1}{2} \text{ Ans.}\\
&\text{Hence } x=\underline{2} \text{ Ans.}
\end{aligned}
$$

$$
\begin{aligned}
&(2)\ 5x-\frac{3(1-x)}{(3-x)}=2x-\frac{3(2-x)}{(2)}\\
&\frac{18x-5x^2-3+3x}{3-x}=\frac{4x-6+3x}{2}\\
&\text{clearing of fractions } 36x-10x^2-6=27x-18-7x^2\\
&\text{transposing } -10x^2+7x^2+36x-27x=6-18\\
&\text{collecting } 3x^2-9x=12\\
&\text{dividing by 3 } x^2-3x=4\\
&\text{completing square } x^2-3x+\tfrac{9}{4}=\frac{16+4}{4}=\tfrac{25}{4}\\
&\text{taking root } x-\tfrac{3}{2}=\pm\tfrac{5}{2}\\
&\therefore\quad x=\tfrac{3}{2}\pm\tfrac{5}{2}=\underline{4} \text{ or } \underline{-1} \text{ Ans.}
\end{aligned}
$$

Mensuration.

MALES.

Answer one Question.

1. How long will it take a man to walk round a square field whose area is $5\frac{1}{4}$ acres, at the rate of a mile in $10\frac{2}{3}$ minutes.

$5\frac{1}{4}$ ac. = 27225 sq. yds. area of field.

$\therefore$ side of square = $\sqrt{27225}$ = 165 yds.

and 165×4 = 660 yds. length of boundary.

Wherefore 1760 yds. : 660 yds. :: $10\frac{2}{3}$ min. : time required.

$\frac{32}{3}$ min. $\times\frac{660}{1760}$ = $\underline{4 \text{ min.}}$ Ans.

2. The radius of a circle is 25 inches, and the angle subtended by an arc at the centre is 32° 31′ 12″·4: find the length of the arc.

circumference = 50 in. × 3·1416 = 157·08 in.

360° = 1296000″

32° 31′ 12″·4 = 117072″·4

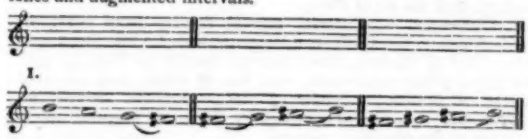
$\therefore$ 1296000″ : 117072″.4 :: 157·08 in. : length of arc.

$\frac{157\cdot08 \text{ in.}\times117072\cdot4}{1296000}=\frac{18389732\cdot592 \text{ in.}}{1296000}=\underline{14\cdot189 \text{ in.}}$ Ans.

Music.

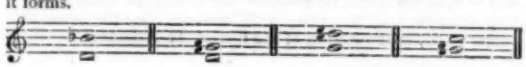
A quarter of an hour allowed for this Paper.

1. Write the upper tetrachord of B (*Si*) minor in every form with which you are acquainted. Mark the places of the semitones and augmented intervals.

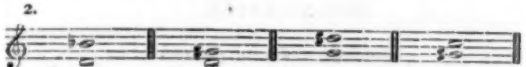


1.

2. Write under each of the following pairs of notes the name and quality (major, perfect, diminished, or other) of the interval it forms.



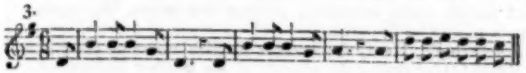
2.



Minor 6th. Pluperfect 4th. Augmented 5th. Diminished 4th.

3. Write, from memory, the first four or more measures of any tune you can remember.

3.



ERRATUM.—The answer to question 3, Standard III., in the Recent Inspection Questions in THE PRACTICAL TEACHER for May, should have been £92,010 14s. 5d.

Recent Inspection Questions.

[The Editor respectfully solicits contributions—all of which will be regarded as STRICTLY PRIVATE*—to this column. For obvious reasons, it cannot be stated in which district the questions have been set.]*

Arithmetic.

STANDARD I.

(1) Put down—eight, seven hundred and ten, seventy-one, seven hundred and one, four hundred and fifty-six—add them up. Ans. 1946.

(2) Put down—seven hundred and thirty-two; under it three hundred and forty-five—subtract. Ans. 387.

(3) From two hundred subtract nineteen.
Ans. 181.

STANDARD II.

(1) From thirty-six thousand three hundred and nine, take two thousand seven hundred and forty-one.
Ans. 33,568.

(2) Multiply eight thousand three hundred and sixty-five, by seven hundred and sixty.
Ans. 6,357,400.

(3) Put down—thirty-nine thousand two hundred and fifty-eight—divide by six. Ans. 6543.

STANDARD III.

(1) If 754 be the divisor, and 564,647 be the dividend, what is the quotient? Ans. 748—655.

(2) A's rent for the quarter is £3 17s. 4d., while B's quarterly rent is £5 0s. 4d. How much is B's yearly rent more than A's? Ans. £4 12s.

(3) Add together seven hundred and fifty-four pounds twelve and sixpence, sixteen pounds four and twopence halfpenny, four hundred and sixty-nine pounds sixteen and fivepence halfpenny, £14 9s. 6¾d., and £16 14s. 9¾d. Ans. £1271 17s. 6½d.

(4) Take nine thousand and nine pounds fourteen and sixpence halfpenny from £19004 16s. 2d.
Ans. £9995 1s. 7½d.

(5) Find the value of 601 farthings, 12 crowns, 642 fourpenny pieces, and £12 4s. 6½d.
Ans. £26 11s. 0¾d.

STANDARD IV.

(1) Multiply £35 5s. 3¾d., by 99.
Ans. £3491 5s. 11¼d.

(2) Divide £94 10s. 6d., by 3067.
Ans. 7¼d.—1801.

(3) Supposing there are 51 working hours in a week, and a man gets 6½d. an hour and that his week's wages are £1 5s. 6½d.—what time did he lose?
Ans. 3hr. 50$\frac{8}{13}$m.

(4) If the cost of carrying luggage is 4s. 2½d. a ton, how many tons can be carried for £1 11s. 6¾d.?
Ans. 7$\frac{1}{3}$ tons.

(5) Reduce 1¾ guineas + 14 shillings + 3¼d., to farthings. Ans. 2451 farthings.

STANDARD V.

(1) Find the cost of 2 cwt. 3 qrs. 15 lbs. 5 oz. at £46 8s. 3d. per cwt. Ans. £133 19s. 7$\frac{41}{256}$d.

(2) If £2 12s. 6d. be the cost of 408 yards, what would 2 fur. 3 pls. 4½ yds. cost? Ans. £2 19s. 3$\frac{5}{68}$d.

(3) If a train starts at 9 a.m. and travels 196 miles by 3.10 p.m.—what was the average distance per hour.
Ans. 31$\frac{8}{31}$ miles.

(4) What would be the cost of 139$\frac{3}{5}$ tons at £1 19s. 11¾d. per ton? Ans, £279 4s. 5¼d.

(5) A bill:—1 cwt. of apples at 3½d. a lb., 47¼ lbs. of grapes at 8d. a lb. 125 oranges at 10d. a score, ¾ cwt. of potatoes at £5 10s. a ton. Ans. £3 13s. 6d.

STANDARD VI.

(1) Simplify
$\frac{\frac{1}{6}+\frac{4}{3}+\frac{2}{1}-\frac{11.4}{3.6}}{\frac{48.0}{18.0}\times\frac{6.0}{4.80}}$ and $\frac{3\cdot009+1\cdot091-3\cdot957044}{6\cdot48}$
Ans. 4$\frac{1}{18}$ and ·022061.

(2) A, B, and C can do a piece of work in 12 days, and A and B can do it in 18 days—in what time could C do it alone? Ans. 36 days.

(3) Simplify 9·99375 tons, and 5$\frac{7}{8}$ of 20s. + $\frac{3}{5}$ of 3 guineas + $\frac{1}{5}$ crown. Ans. 9 tons 19 cwt. 3 qrs. 14 lbs. and £7 5s. 0$\frac{3}{4}$d.

(4) If a pane of glass measures 2$\frac{3}{4}$ feet by 1$\frac{1}{2}$, what would be the cost of 8 panes at 14s. 6d. a sq. foot?
Ans. £23 4s.

(5) If a 5½d. loaf weighs 4lbs. when wheat is 46s. a quarter, what should be paid for 32 lbs. of bread when wheat is 56s. a quarter? Ans. 4s. 5$\frac{1}{2}\frac{3}{3}$d.

Domestic Economy.

STAGE III.—BRANCH I.

(1) How may air and diet affect our health?

(2) Why is cleanliness important in sickness and health?

(3) What precautions are to be taken against infections?

BRANCH II.

(1) Why is extra heat applied at first both in boiling and roasting meat?

(2) How should fish be boiled?

(3) State how you would prepare cauliflower and potatoes for the table.

(4) What system for savings do you prefer and why?

Physiology.

STAGE III.

(1) What is nerve, and what is its appearance in the body?

(2) Describe the seat and branches of the nervous system through the human frame.

(3) Account for the effects of cutting through the spinal cord.

(4) Describe the structure of the eye.

MAKE HAY WHILE THE SUN SHINES.

Words by GEO. BENNETT. *Music by* T. CRAMPTON.

Moderato. mf
1st TREBLE.
2nd TREBLE.
BASS.
1. There's a pro- verb fa - mil - iar to young and to old, Which a - mong the most gold - en of
2. In the great field of life there is much to be done, There's a work to ac - com-plish—a
KEY F. Moderato. mf
max - ims we hold, That in la - bour or learn - ing no tri - fies should stay, But while the bright
prize to be won; For with com-peers and ri - vals who brook no de - lay, We must toil while the
C. t.
sun shines be mak - ing the hay. In the spring-tide of hope, in the morn - ing of youth, We must
bright sun is rip - 'ning the hay. There is more to be done than in times that are past, And but
f. F.
e - ver be ear - nest for knowledge and truth; Working on with a will as the hours pass a -
small is their chance who would lag with the last; With the fore-most we'll strive in the morn - ing of
Symph.
- way, And toil while the sun shines to make up the hay.
day, And while the bright sun shines be mak-ing the hay.
Symph.

THOMAS DUNMAN.

WE regret to have to announce the death, at the early age of thirty-two, of a promising young Science Teacher and Lecturer—Mr. Thomas Dunman, lecturer on Physiology at the Birkbeck Institution, and physical science lecturer at the Working Men's College, Great Ormond Street, the story of whose brief life furnishes a remarkable instance of what may be done by energy, perseverance, and a strong faith in one's own powers. He had to contend against adverse circumstances from the outset of his career, but his thirst for knowledge, and especially for scientific knowledge, was unquenchable. His early education was limited, but his reading was wide, his memory was one of remarkable power, and he possessed a mental vigour and ability of unusual character. He made himself master of French, Greek, and Latin, and attained considerable proficiency in mathematics and physical science, while working for his living at a most uncongenial occupation, and it was always in spite of his surroundings he went on adding to his stock of knowledge.

About seven years ago he took charge of the physiology class at the Working Men's College in Great Ormond Street, and the attractiveness of his style, the lucidity of his exposition, and the strong personal enthusiasm for his subject, which he imparted to every student, soon made the class one of the largest and most popular in the college, while the practical results, as shown by the examinations at South Kensington, attested to the thoroughness of his teaching.

The like success attended him in other courses of lectures in other branches of science, and it is not too much to say that Mr. Dunman has been greatly instrumental in infusing new life into the admirable institution which Mr. Frederick Denison Maurice founded. At the Birkbeck Institution, too, where he succeeded Dr. Aveling as physiology lecturer, his work was much appreciated, although latterly failing health somewhat interfered with his labours there.

In 1879 he published a very useful 'Glossary of biological, anatomical, and physiological terms,' which has sold well among students, both here and in America; and finding his lectures on popular scientific subjects were so much appreciated, he commenced last year to issue them in pamphlet form. In this way four had appeared. 'The Mechanism of Sensation,' 'The Starlit Sky,' 'Pre-historic Man,' and 'Volcanoes and Coral Reefs.' He contributed to Cassell's 'Science for All,' to Ward and Lock's 'Universal Instructor,' 'Amateur Work,' and several other publications, and his career has been cut short just when it seemed that at last the tide was beginning to turn that would bring the fame and fortune to which his hard work and untiring industry would justly entitle him.

He married early, and the effort to support his family by science teaching and lecturing, may fairly be said to have cost him his life, for whatever he undertook he worked at conscientiously and enthusiastically, and in his teaching especially, he was, as we have said, thorough, hating anything like 'cramming' or 'scamping.' During the past two years there were warnings that his energies were being too strongly taxed, but they were unheeded, and at the beginning of the present year brain troubles became markedly apparent, and he was obliged to give up work. But it was too late, he gradually grew worse, and died on the 9th inst., leaving a widow and two children, for whom he had been unable to make any provision, as will be readily understood by those who have any knowledge of the kind of rewards which in this country fall to those who devote their lives to science.

C. W.

ANSWERS TO ALGEBRA QUESTIONS IN 'THE SCHOLAR,' FOR JUNE, 1882.

EXERCISE V.

(1) $\frac{3b}{2}$. (2) $\frac{35ab}{4}$. (3) $-\frac{3x}{2}$. (4) $-6xy$. (5) $\frac{83ab}{42}$.

EXERCISE VI.

(1) $-10b$. (2) $8abc$. (3) $6xyz$. (4) $8cde$. (5) $-2a+3b-7c$. (6) $20x$ pounds and $4y$ shillings. (7) $\frac{a}{2}$— (8) $3a+\frac{3}{4}b+2c$. (9) The terms destroy one another. (10) $9(a+b)$.

EXERCISE VII.

(1) $3x+4y+5z$. (2) $3a-5b-6bc+4d$. (3) $9a+5b-3c+2d+e-f$. (4) $15x^3-60y^2-2z^2$. (5) $-5a+4b+c-2d+7$. (6) $4x^3+2a^2+2b^2$. (7) $-3a+10b+5d$. (8) $5a+2b-6c+3d$. (9) $28(a+b)-15(c+d)$.

ANSWERS TO ARITHMETICAL QUESTIONS IN 'THE SCHOLAR,' FOR JUNE, 1882.

(No. 4.)

STANDARD III.

A. 1. 37,722—11.
2. 24,391—19.
3. 13,357—322.

B. 1. 230,436.
2. 10,103—485.
3. 810—171.

C. 1. 26,994—44.
2. £723 14s. 4½d.
3. £26,644 11s. 7d.

D. 1. £643 11s. 4½d.
2. 585,491 farthings.
3. 1692 boys.

E. 1. 17,000 marbles.
2. £62 4s. 7½d. less.
3. 4100—4120.

F. 1. 2049—20,166.
2. £28,343 18s. 0½d.
3. £914 9s. 9d.

ADVANCED EXAMINATION.

1. Boy, 9½d.; girl, 1s.
2. £292 5s. 10d.
3. £761 10s. 10½d.

STANDARD IV.

A. 1. £2061 1s. 6d.
2. £5908 8s. 3¾d.
3. £294 5s. 5½d.

B. 1. £28,410 4s. 4½d.
2. 129 15s. 11½d.—49.
3. 176,391 lbs.

C. 1. 2¾d.—43,118.
2. 139 tons 16 cwt. 3 qrs. 14 lbs. 14 ozs.
3. £2 5s. 2½d.

D. 1. 111 wks. 14 h. 5m. 17sec.
2. 96 weeks.
3. £7 4s. 1d.

E. 1. 564,537,600 sq. ft.
2. 212 dresses, 3 yds. 1 qr. left.
3. £5677 17s. 5½d.

F. 1. 256,015 mins.
2. £872 2s.
3. 255,636 inches.

ADVANCED EXAMINATION.

1. 342 ton. 3 cwt. 3 qrs.
2. 14 lbs.
3. 84½ lbs.

STANDARD V.

A. 1. £4 5s. 10½d.
2. £50 9s. 4½d.
3. 166 18s. 9¾d.

B. 1. £298 1s. 8d.
2. 4937 2s. 3¾d.
3. 1891 13s. 6½d.

C. 1. £13,784 10s. 2½d.
2. £39,910 7s. 3½d.
3. £90 18s. 7$\frac{7}{12}$d.

D. 1. £32 6s. 11½d.
2. £34 4s.
3. £1297 7s. 11d.

E. 1. £15 10s. 6½d.
2. £332 1s. 6¾d.
3. £331 12s. 2½d.

F. 1. 2800 marbles.
2. £24 0s. 9$\frac{3}{16}$d.
3. £27 7s. 10½d.

ADVANCED EXAMINATION.

1. £1712 10s. gain.
2. £4213 8s. 8$\frac{3}{16}$d.
3. £48 7s. 10d.

STANDARD VI.

A. 1. $2\frac{1}{2}\frac{3}{5}$.
2. $2\frac{1}{3}\frac{1}{5}$.
3. $2_{17}\frac{7}{1}$.

B. 1. 6s. $1\frac{1}{4}$d.
2. 37.665.
3. $\frac{11}{12}$.

C. 1. £20 14s. $4\frac{1}{4}$d.
2. £8 7s. 11d.
3. $14\frac{3}{2}\frac{3}{5}$.

D. 1. £7 12s. 0·5472d.
2. 5 hrs. 8 mins.
3. ·497857142.

E. 1. $3\frac{1}{1}\frac{1}{7}$.
2. $\frac{1}{1}\frac{1}{2}\frac{1}{0}$.
3. £50 8s.

F. 1. 651·348.
2. $1\frac{1}{2}\frac{3}{5}\frac{3}{6}$ lbs.
3. £3 9s. $8\frac{1}{1}\frac{1}{6}$d.

ADVANCED EXAMINATION.

1. $19\frac{1}{2}$ hours.
2. £1 5s. 6d. ·6525.
3. $9\frac{1}{1}\frac{3}{5}$ days.

STANDARD VII.

A. 1. £117.
2. £89 13s. 3d.
3. $2\frac{1}{2}$ per cent.

B. 1. £7 2s. $7\frac{1}{2}\frac{1}{3}$d.
2. $2\frac{1}{2}$ years.
3. £357 2s. $10\frac{1}{2}$d.

C. 1. $143\frac{2}{3}$ days.
2. $3\frac{1}{2}\frac{1}{3}$ per cent.
3. Man to boy as 85 to 63.

D. 1. £427 18s. $8\frac{1}{2}\frac{1}{3}$d.
2. £189 12s. $10\frac{1}{2}\frac{1}{3}$d.
3. 177·369+yards.

E. 1. May 19th, at 3·46 a.m.
2. £20 14s. $7\frac{1}{1}\frac{1}{3}$d.
3. $7\frac{7}{1}$d.

F. 1. £600.
2. £843 12s. $11\frac{1}{2}\frac{1}{3}$d.
3. £83 17s. $11\frac{3}{1}\frac{3}{6}$d.

ADVANCED EXAMINATION.

1. 14s. $8\frac{1}{2}$d. a yard.
2. $5\frac{1}{2}\frac{1}{3}$ per cent.
3. £141 7s. $10\frac{1}{2}$d.

SOLUTIONS OF THE 'ADVANCED EXAMINATION' QUESTIONS IN 'THE SCHOLAR,' FOR JUNE, 1882.

STANDARD III.

1. $2\frac{1}{2}$d. × 80 = 200d. excess received by girls.
£8 15s. − 200d. = 1900d. to be divided equally among the whole (120 *b.* + 80 *g.* =) 200.
Then 1900d. ÷ 200 = $9\frac{1}{2}$d. a boy's share
and $9\frac{1}{2}$d. + $2\frac{1}{2}$d. = 1s. a girl's share } Ans.

2.
140 at 4d. = 560d. a week.
(280 − 140) ÷ 4 = 35 at 5d. = 175d. ,,
60 at $6\frac{1}{2}$d. = 390d. ,,
$\frac{280-(140+35+60)}{3}$ = 15 at 8d. = 120d. ,,
20 at 9d. = 180d. ,,
The rest = 10 at 10d. = 100d. ,,

Total weekly receipts = 1525d.,
and 1525d. × 46 = 70150d. = £292 5s. 10d. Ans.

3.

		£	s.	d.
Jan.	receipts amount to	238	14	$7\frac{1}{2}$
Feb.	,, = £238 14s. $7\frac{1}{2}$d. − £79 16s. 0$\frac{1}{2}$d. =	158	18	7
Mar.	,, = £158 18s. 7d. − £48 17s. $10\frac{1}{2}$d. =	110	0	$8\frac{1}{2}$
April	,, = £507 13s. 11d. ÷ 2 =	253	16	$11\frac{1}{2}$
	Ans.	£761	10	$10\frac{1}{2}$

STANDARD IV.

1. $1\frac{1}{2}$ lb. × 500 = 875 lb. of bread eaten daily by men
$1\frac{1}{4}$ lb. × 400 = 500 lb. ,, ,, women
1 lb. × 680 = 680 lb. ,, ,, boys
$\frac{3}{4}$ lb. × 620 = 465 lb. ,, ,, girls
2520 lb. ,, ,, all.

Five lb. of flour makes six lb. of bread, hence (2520 ÷ 6) × 5 = 2100 lb. *flour* consumed daily.
2100 lb. × 365 = 766,500 lb. = 342 ton 3 cwt. 3 qr. Ans.

2. $127\frac{1}{2}$ cwt. = 14,280 lb.
$10\frac{1}{2}$ lb. × 112 × 5 = 6020 lb. eaten by horses.
14280 − 6020 = 8260 lb. eaten by 118 cows in 5 days.
8260 ÷ 5 = 1652 lb. ,, 118 ,, 1 ,,
1652 ÷ 118 = 14 lb. Ans.

3. 2 tons 15 cwt. 0 qr. − 11 cwt. 2 qrs. = 2 tons 3 cwt. 2 qr. = 4872 lb., weight of 56 bags filled with coal.
4872 lb. ÷ 56 = 87 lb. weight of a bag *and* coal.
87 lb. − $2\frac{1}{2}$ lb. = $84\frac{1}{2}$ lb. Ans.

STANDARD V.

1. Total cost = 11000g. + ($1\frac{1}{2}$g. × 500 = 625g.) = 11625g.
300g. × 30 = 9000g., and $22\frac{1}{2}$ × 150 = 3375g.
and 9000g. + 3375g. = 12375g. = £12993 15
£18 10s. × (500 − 450) = £ 925 0

Total selling price 13918 15
Deduct the outlay 11625g. = 12206 5

Ans. £1712 10

2.

	£	s.	d.				
10 cwt. is $\frac{1}{2}$	4	17	8				
			10				
	48	16	8	price of	10	tons.	
			10				
	488	6	8	,,	100	,,	
			8				
	3906	13	4	,,	800	,,	
	293	0	0	,,	60	,,	
	9	15	4	,,	2	,,	
5 cwt. is $\frac{1}{2}$	2	8	10	,,		10	cwt.
1 cwt. is $\frac{1}{2}$	1	4	5	,,		5	,,
28 lb. is $\frac{1}{4}$	0	4	10	$\frac{1}{2}$,,		1	,,
14 lb. is $\frac{1}{8}$	0	1	2	$\frac{1}{2}$,,			28 lb.
2 lb. is $\frac{1}{7}$	0	0	7	$\frac{1}{2}$,,			14 ,,
	0	0	$1\frac{3}{1}\frac{3}{0}$	,,			2 ,,
Ans.	£4213	8	$8\frac{8}{1}\frac{7}{4}\frac{7}{0}$	,,	862	16	44 lb.

3.

	£	s.	d.
7 × 8 × $9\frac{1}{2}$ = 532 hours at 7d. = 3724d. =	15	10	4
10 × 7 × 9 = 630 ,, $6\frac{1}{2}$d. = 4095d. =	17	1	3
6 × 11 × 10 = 660 ,, $5\frac{1}{2}$d. = 3795d. =	15	16	3
Ans.	£48	7	10

STANDARD VI.

1. $\frac{15}{21\frac{1}{2}} = \frac{30}{43}$ fraction of the coat done by A.
$1-\frac{3}{4}\frac{0}{3}=\frac{1}{4}\frac{3}{3}$ fraction done by B, in (15 − 9 =) 6 hours.
$(\frac{1}{4}\frac{3}{3} \div 6)=(\frac{1}{4}\frac{3}{3} \times \frac{1}{6})=\frac{1}{2}\frac{3}{5}\frac{1}{8}$, done by B in 1 hour.
Hence 258 ÷ 13 = $19\frac{1}{1}\frac{1}{3}$ hours. Ans.

2. ·0015 pint × 210 × 5 = 1·575 pints in a week.
1·575 × 44 = 69·3 ,, year.
69·3 pints = 8·6625 gallons, which at 2·95s.
= 25·5543753s. = £1 5s. 6·6525d. Ans.

3. Bringing the men to their equivalent in women, we have 7m. = 10w., hence 1m. = $1\frac{3}{7}$w., and 16m. = $(16 \times 1\frac{3}{7} =) 22\frac{6}{7}$ women, Then $22\frac{6}{7}+12=34\frac{6}{7}$, the equivalent in women of the 16 men and 12 women. Then by proportion, the men being eliminated,—

$$\frac{5\text{d.} \times 400 \times 10}{60 \times 34\frac{6}{7}} = 9\frac{1}{1}\frac{3}{7} \text{ days. Ans.}$$

STANDARD VII.

1. £300 ÷ 480 = £·625 = 12s. 6d. prime cost per yard.
£300 + (£300 × 15 ÷ 100) = £345, total selling price.
£150 + ($\frac{1}{10}$ of £150) = £180 selling price of 240 yards.
£·625 × 100 + ($\frac{1}{10}$ of £62·5) = £68·75 ,, ,, 100 ,,
£·625 × 60 = £37·5 ,, ,, 60 ,,
Hence the above 400 yards sell for £286·25.
Then the remaining 80 yards must sell for (£345 − £286 5s.) £58 15s., that is at 14s. $8\frac{1}{2}$d. a yard. Ans.

2. £67 10s. − £65 = £2 10s. allowed as discount.
That is, on the true basis of discount, £65 (the P. W.) would make £2 10s. interest in 8 months, and consequently in 12 months would make £2 10s. × $1\frac{1}{2}$ = £3 15s. Hence £100 would make $\frac{1}{6}\frac{0}{5}$ or $\frac{2}{1}\frac{0}{3}$ of £3 15s., and $\frac{2}{1}\frac{0}{3}$ of $3\frac{3}{4}=\frac{2}{1}\frac{0}{3}$ of $\frac{1}{4}\frac{5}{0}=\frac{3}{5}\frac{0}{3}$ = $5\frac{1}{1}\frac{7}{3}$ per cent. Ans.

3. £400 requires £20 interest, hence £60 is paid off end of 1st year.
340 ,, £17 ,, £63 ,, off end of 2nd year.
277 ,, £13·85 ,, £66·15 ,, off end of 3rd year.
210·85 ,, £10·5425 ,, £69·4575 ,, off end of 4th year.
hence £210·85 − £69·4575 = £141 7 $10\frac{1}{2}$. Ans.

Publications Reviewed.

*** We are sorry to disappoint the many friends who desire us to quote the price of each work noticed in our columns. This we would respectfully point out is the publishers' duty and not ours; we give publicity enough to a book when we review it. Our readers should peruse the advertisements in our pages, and failing to find the price here, it would be no great trouble or expense to drop a line to the publishers, whose names and address we will gladly give.

Magnetism and Electricity. By R. Wormell, D.Sc., M.A. Thomas Murby, 32, Bouverie Street, Fleet Street, E.C.

SECOND NOTICE.

Thus to compare :—

	WORMELL.	GUTHRIE.
Declination	20°.	17°.
Year of no Declination	1652	1657.
Maximum Declination	24°41′ *W.*	24°34′ *W.*
Year of Maximum Declination ...	1818.	1820.

The blunders that follow are not the fault of Dr. Wormell. They are all typographical errors, but we point them out in order to be of some service to the author in his production of the second edition, that will infallibly be required very speedily. (*a*). Title-page, last line, Fleet, Street, E.C., is not good. (*b*). Table of Contents, p. vi., line 6 from end, for 69 read 70. (*c*). P. 27, fig. 11. The letters of the diagram are bad and are deficient. The indescribable blur in the corner to the right should be R. Dr. Wormell has unfortunately in the description two R's for different lines (see lines 5 and 9), and the *n*, *s* referred to in line 13 of the letter-press is conspicuous by its absence in the diagram. (*d*) P. 37, line 5 from end, after the word figure, the number 5 ought to be inserted. (*e*) P. 54, line 4, 1.20 should be 120. (*f*) P. 100, line 8 from end under *d*, there is an omission. We are told to charge the jar as in ( ). (*g*) P. 103, line immediately above the figure, *a j* is referred to not visible in the diagram. (*h*) In Fig. 26, p. 128, would it not be better if the needles had their ends distinguished? (*i*) In Fig. 27, p. 129, there is no B, though reference is made to one in the text. (*k*) Why does Dr. Wormell have a little spelling of his own whenever he writes the name of Ruhmkorff? All the world holds to the orthography just given; but Dr. Wormell, with a persistency that seems as if it must be born of certainty, writes Rhumkorff. (*l*) P. 178, line 7 from end, for 'that' read 'the.' (*m*) P. 203, line 9 from end, for 'sparking' read 'striking.' (*n*) P. 208, Fig. 58, wants the *k k'* referred to in the line immediately above that otherwise admirable diagram. (*o*) P. 210, lines 14, 15, the strokes are turned in exactly the opposite direction to that each should take. (*p*) P. 211, line 1, for L read E. (*q*) P. 218, line 10, ought not R' and C' to be respectively R and C? (*r*) P. 227, line 10. For 'infringing' read 'impinging.' (*s*) P. 229, line 12 from end, we have suddenly introduced on this, the last page but two, as a sort of verbal Parthian arrow, the word 'dinymmetry' without a word of explanation.

We turn to the more agreeable, and, in this case, easy task of pointing out the good points in this notable little volume. (1). Dr. Wormell's definitions are very clear. Those of a current (p. 116), of a volt (p. 122), of a magnetic pole (p. 8), are good examples. He almost succeeds in making the idea of the dreaded 'potential' plain to beginners, and would wholly succeed with students who have given the subject of electricity a little attention. We are inclined to think that the best definition of 'potential' may be obtained by following up the analogy to temperature, and adopting the definition of the latter given by Professor Balfour, 'the condition of a body in regard to sensible heat,' we define potential as 'the condition of a body as to measurable electricity.'

On p. 36 Dr. Wormell manages to edge in a little piece of that sadly-neglected study, astronomy. It is to us always matter for regret that whilst every person pretending to education can tell you the common names of the ordinary flowers he or she sees by day, scarcely any can tell the name of one of the stars that are over and under them night and day.

Dr. Wormell, who is nothing, if not practical, gives a very interesting account of the compass in relation to modern ships. As many of these are of iron, and often carry iron, the reader will readily understand that many ingenious devices have to be planned for preventing the interference of the material of which the ship is composed, and often of its cargo, with the compass-needle. These are all narrated in very clear and interesting fashion in the eighth lecture on magnetism.

And, indeed, generally we may say that the great virtue of this book is clearness. Every explanation, with scarcely an exception, is admirably done, and the boy who cannot understand the principles of the two great cognate sciences, after reading Dr. Wormell's book, may reasonably despair of ever grasping them. As illustration of this clearness of explanation we may refer to the account of the condenser on pp. 96-98 or the proof, in connection with the tangent galvanometer, that the strength of the traversing current is proportional to the tangent of the angle through which the needle turns (p. 132, note), or on p. 169 the statement of Lenz's law.

An admirable analogy between the work done by a flow of water and that done by an electric current is worked out on pp. 192, 193, and would alone stamp the book as original.

The abbreviations D.P. for difference of potential, and E.M.F. for electro-motive force, and the capital mnemonic in the note on p. 194 show that Dr. Wormell is a teacher, and knows the value of time. Nor does our author despise occasional recapitulations (p. 130), and summings-up (p. 149.)

But, above all, we ought to praise the practical nature of this work. In these days when boys and men alike are cramming electricity and magnetism by book, and when even the books are far too full of theory and far too empty of descriptions of practical work, it is a delight to meet with a treatise wherein not only are simple experiments described in full in the body of the lectures, but every now and again a pause is made, and methods of making apparatus and conducting experiments are given in full. Even in describing the Holtz' machine, Dr. Wormell takes care to tell the student to place the discharging rods in contact before the machine has been set in motion, and to separate them after it is in motion—an important practical direction that we never remember to have seen in any other book on electricity.

The book is what we may call a progressive book. It leads the student on from the simple things to the more complex by well-graduated steps, and it ever keeps before him the few simple principles lying at the basis of magnetism and electricity, tracing back the most important and apparently difficult machines to one or more of these fundamental generalisations.

Finally, the book which brings us nearly up to the present hour's knowledge, though the photophone is omitted, ought to be of use especially to three classes of of people : (1) teachers of these two sciences, who might do well to model their lessons on those given here; (2) students who have to 'get up' these subjects for examination; (3) that increasing class of folk we meet in ordinary society, who, reading in their daily newspapers and in their monthly magazines of dynamo-machines, carbon points, Faure's accumulator, *id genus omne*, are naturally anxious to understand the general principles and construction of these machines that are intruding themselves so prominently and with such remarkable effect into our daily life. For these, no book we have read can compare with that we now lay down with the same statement as that with which we started :—If all the High School Series, of which the volume under review is one are as excellent as Dr. Wormell's little treatise, their standard will be very high.

Johnston's Sixpenny National Atlas. Edinburgh and London: W. and A. K. Johnston.

If scholars fail in learning geography it will not be from lack of maps, and those too of remarkable merit, together with cheapness. Among those who cater thus economically and excellently for the public, Messrs. Johnston occupy a deservedly leading position. We have before us specimens from their select list of maps suitable to all requirements,—from the school-boy who has but a penny to purchase a neat and excellent map of his county, or any other portion of the world he is studying,—to the nobleman whose library will be usefully adorned by the guinea map (of any division or country), on cloth and roller and varnished.

With such a plethora of wealth in the way of maps, selection becomes difficult; yet we would advise teachers and school managers to send for a list of Messrs. Johnston's maps, and see how well every kind of requirement can be well and cheaply supplied. In the series of school wall maps (4 ft. by 3 ft. 6 in.) an excellent map can be had mounted and varnished for 12s.!

In the little *Sixpenny Atlas* we have placed at the head of our list we have sixteen maps that are most of service to beginners, boldly and clearly printed with sufficient colour, but not a confusing profusion thereof, and wisely arranged in regard to the names being just enough, and not more than enough, for beginners. The land stands out clear in relief from the light blue tint of the water; large political divisions are marked by a bold red line; mountains by an equally bold dark blue line, and the main line of rivers marked without the needless addition of unnamed tributaries. This, we take it, is as it should be, in contradistinction to many maps ostensibly for beginners which are unwisely forced to do duty for everything—Botany and Zoology included. In the *Shilling Atlas* of the same series, we have twenty-four maps, and this collection done up in durable cloth.

The *Penny Maps* (14½ by 11½ inches), are issued in four series. Coloured ordinary maps with names; projections; outlines; and test maps, in which names only are omitted. Of these Penny Maps, the latest additions are an excellent set of county maps remarkable for clearness, and printed in pale red or pink tint. Of these, Surrey appears to be the most finished, as it contains,—in addition to the roads, railroads, and rivers,—the principal range of hills that extends lengthwise through the county, from Westerham to Reigate, Dorking, and Guildford, and terminates with the *Hog's Back* at Farnham, and also the isolated eminence of Leith Hill. Neither Middlesex nor Kent (the only others of the county series we have before us) contains marks for the hills. In regard to Middlesex, Highgate and Harrow ought thus to be marked, if not the elevated district that borders Hertfordshire, and culminates at Highwood, north of Mill Hill. Kent may, with more reason, complain of its hills being omitted. Its North Downs are a continuation of the Surrey heights, before mentioned, and extend through the county to Dover, and thence form most of the eastern elevations to Margate, where the chalk gives way to the clay that culminates in the Sheppy cliffs. In the map of Middlesex we have London marked by shaded lines that will soon have to be extended, and which in the present map stretch from Kensal Green on the west to Blackwall on the east; and from Holloway on the north to Camberwell on the south. We must now greatly extend our range, and notice Rolfe's truly magnificent map of *The Western Hemisphere* which Messrs. Johnston have just printed for themselves and Mr. Rolfe of Chicago. This noble map is printed in colours, (5 ft. by 4 ft.,) and has the coast marked by an additional tint. The most important territories, besides being tinted, are further indicated by delicate single or double oblique lines in contradistinction to territories merely coloured. For accuracy, beauty, and completeness, this map leaves nothing to be desired. The corners are filled up with maps of the North and South Polar Regions; the distribution of plants and animals, and the distribution of wind and rain over the Western Hemisphere. In the body of the map we have the great ocean currents plainly marked, and by which we can trace the Gulf Stream in all parts of its course. The descriptive letter-press at the foot of the map, a mere outline of geographical facts, we should like to see eliminated and the space occupied by charts or small explanatory maps of physical phenomena, such as the leading geological features of North and South America, or other matters illustrative of geographical science.

The above remarks will apply, *mutatis mutandis*, to *Rolfe's Eastern Hemisphere*, similar in size and other particulars to the Western. Together these maps form one of the finest illustrations of geographical science hitherto published, and can be used for smaller divisions with little to be desired in the way of detail. The four accompanying small maps illustrate the distribution of plants and animals, and wind and rain over the Eastern Hemisphere, and also the hemisphere of the greatest amount of land, and a corresponding one of the greatest amount of water.

Next we have, on the same magnificent scale, a *Map of Wales* (4 ft. 2 by 3 ft. 6 inches) and which is as remarkable for boldness as for beauty. The names of towns and villages are printed in large type, varying in three forms according to the importance of the place, *i.e.*, county towns being printed in full capitals, other towns in Roman, and villages in Italic type. The principal mountains have also a distinct type to themselves, of clear small capitals with the heights given in figures; the rivers have also their special type, and so have the bays and other openings. The railways and roads are also shown, and the main physical features given. In this we should like to see a few more names, such, for example, as the beautiful falls of the Tawe, and those of the Mynydd on its course towards the Neath. To the sons of old Cambria this map cannot fail to be welcome, and will doubtless find a place in every school in Wales, not only in regard to its excellence, but also on account of its cheapness; it being issued, varnished on cloth and roller, for 12s. This wall map is accompanied by a sixpenny hand-book descriptive of the Principality, which we should like to see expanded by larger type, and accompanied with wood-cut illustrations.

On the same large scale Messrs. Johnston have brought out a map of British North America, measuring 7 ft. by 4 ft. 2 inches, which will be particularly welcomed throughout Canada and other portions of the Dominion.

Africa, similarly treated in size and carefulness of finish, contains the most recent particulars down to the termination of the Zulu and Transvaal contests. The details of the south-western coast are much more fully treated than on any map we have seen. The comparatively unknown regions are also well filled up, and the dimensions given of the great central lakes. The Cape and other portions of South Africa of course are marked by a greater abundance of names, sufficient indeed for the educational requirements of all the schools of Cape Colony and Natal.

Every-day Life in our Public Schools. Edited by Charles Eyre Pascoe. London: Griffith and Farran.

This book is the work of nine writers, including the editor, who contributes an introductory historical chapter to each school, and the entire account of St. Paul's, Merchant Taylor's, and Christ's Hospital Schools. The book is readable to all, and must be particularly so to old scholars, or those now going through their course at the respective schools. The latter will be especially interested in the details of school life together with the multitude of allusions and slang terms peculiar to each school. To the general reader the opening chapters will be perhaps more interesting, and, in addition to the historical details, the influence of these great educational institutions on the national character cannot fail of arousing thoughtful

reflections. That they have accomplished great things and largely influenced the characters of our greatest men —more in 'the simple paths of manly truth' than in positive scholarship—is undeniable. That they might have done much more and avoided much that is to be deplored is also unquestionable. The great fact appears that the successes attained were very much owing to the accident of a good head-master, but the laxity of the State is also shown in evils being allowed to continue without the slightest attempt at correction. Another more serious consideration is the gradual diverting of these public schools from their original design of being for the benefit of the poor to that of being monopolized by the rich. In some cases—Winchester, for example—the founders gave permission for a few children of the upper classes to be admitted, but these were exceptional, and for the supposed benefit of the newly formed school, and were also in most cases not only limited in number but were to pay for their board. Wykeham only allowed ten of such boys to Winchester, and Mr. Pascoe tell us that 'of the latter class there are now over three hundred in the school—a very considerable and satisfactory (?) encroachment on the diminutive number appointed by Wykeham.' Speaking of Eton, Mr. Pascoe says, 'The summer half is the reign of idleness. All the muttered grumblings of dissatisfied tutors, all the terrors of "trials," "collections," and midsummer examinations, all the wisdom of masters' meetings cannot overthrow the rule of the enticing despot play.' There is something to be said in regard to the health and vigour thus developed, together with the influence of wholesome exercise on manliness, fairness, and other points of character. The tendency of our elementary school system has been to overtask the brain and treat physical exercise with comparative neglect. The consequences are a decidedly low tone of *play* among the children of our board and other schools. Our space, however, will not permit us to remark further on this topic, than to regret that so little is done to gratify our poorer scholars in this matter of play, so dear to every boy, and which is enjoyed so keenly by Etonians, that few leave the place 'without shedding a tear.'

Among the leading public schools, Mr. Pascoe speaks most highly of Winchester, which, he says, 'retains, almost more than any other great foundation school in England, the leading characteristics of its founder's design. Its scholars, it seems to us, are given more to work than to play; are more sober and sedate than the boys of other great schools we have visited; and, withal, are self-reliant, and manly, and modest, and, let us add, possess in a marked degree all the inherent qualities of young English gentlemen. They manage to hold their own in athletic exercises with their compeers of Eton, Rugby, and Harrow; and they more than hold their own with the scholars of these or any other great schools in the great public competitions.' Great praise this! To develope the mass of our youthful population into such characters is a great object. To combine Christian gentleness with simple self-reliance and the manly disdain of all that is mean or ungenerous requires more than intellectual training, more than sedulous theological instruction—which we should be far from wishing to undervalue—and which deficiency some of our great public schools appear to supply, notwithstanding their deficiences in some other respects.

Northumbria, The Captive Chief, and other Poems. By James Thomson. Alnwick: H. H. Blair.

This little book, to meet an honest judgment, must be viewed indulgently in connection with the station and circumstances of its author. He tells us that he is a working-man, and with the modesty of truthfulness counts himself as among the 'numerous versifiers and imitators of the heaven-born Art:' of such we may fairly call him an average specimen, seldom offending against either rhyme or rhythm, and keeping a respectable level of didactic and occasional versification: but neither the author himself, nor any of his better-judging friends, would ever go the length of claiming for him the exalted name and fame of that much-maligned and rarely-existent creature, a true poet. For this we require the fire and pathos of Burns,—feebly imitated in several portions of Mr. Thomson's booklet; we demand gleams here and there of passion and pathos, but are scantly satisfied; where only alternate rhyming so usually occurs, our ear is continually disappointed; and although we shall endeavour to produce at all events one passage worthy of some praise, and are glad to find nearly none deserving of actual censure, still a righteous criticism must pronounce the author no genius, nor his verses on the whole above par.

An unnamed lady, who claims 'never to have written a letter in rhyme before,' but whose commendatory epistle is about the best thing in the book, wisely cautions her humble friend as to his poetic ambitions in this fashion:—

'The lyre the master-minstrel sweeps,
With bowèd heads men pause to hear,
And though its thrilling music clothe
A worthless theme, he need not fear;
The distant zenith holds his star,
Its rays to beauty turn each scar.

But when some nameless minstrel strikes
His trembling lyre with blush and stammer,
His measure, rhythm, and rhyme are scanned,
And woe betide his hapless grammar.
What wonder if he shrink and shiver,
And turn his back on fame for ever.

Accordingly, here and there we find a slip or two in grammar: as thus,

'Oswald,—no more glorious name
In dark Northumbrian history *gleam*.'

His accentuation in rhythm is often wrong: as thus,

'Oswald took their offering meet,
And laid it at Aidan's feet.'

And rhymes generally (as we have said) are conspicuous by their absence in the several ballads and songs, which rarely jingle more than two lines out of four. One, however, and only one, on Poor Doey, is a favourable exception; as thus for a specimen stanza,—but alas, for the slip in grammar!

'Poor Doey's dead and rests her head
Beneath a moss-grown tree;
We placed her there with tears and care—
I mean, my wife and *me*;
We neither spoke nor silence broke,
But in our hearts we said,
Our old friend's gone, and we're alone,
Our poor dog's lowly laid,' etc.

For a better sample, take part of 'The Trysting Tree:'—

'I ken wha's waiting in the glen
Beneath the trysting-tree;
And oh, I ken his heart beats fast,
And a' for love o' me.
My blessing on yon bonnie star—
The star o' hope to me;
It tells me that my Jamie waits
Beneath the trysting-tree,' etc.

But enough; our space is exhausted; and we have given our opinion honestly. The book is well enough for one with the scant educational and social advantages of its author, and will avail to gratify his friends, and perhaps himself: but to one who publishes 'Poems' under the famous and classical name of 'James Thomson' of the 'Seasons,' we can only accord the meed of 'faint praise.'

The Poems of Virgil, Translated into English Prose. By John Conington. Longmans.

The late Professor Conington, a man of rare genius, too early called away to the better world, has translated into vigorous English *verse* in the Marmion metre, all the

Æneid, and, if we are not mistaken, also the Bucolics and Georgics, albeit these may, perhaps, remain still in manuscript. The version now before us, one eminently serviceable to the practical teacher in an educational sense, is apparently the first rough copy in plain prose of what was afterwards matured into livelier and more readable poetry, and as exhibiting the interior of his officina, proves the industrious conscientiousness of the energetic workman; however, why it should have been published, or how it can prosper, in a Sosian sense, we cannot guess, more especially as it seems not to have been intended for publication by its moribund author. Very few people—except, indeed, schoolboys, for what they commonly call 'a crib'—are likely of set purpose to read through the Æneid in prose; albeit, when rhymed, Dryden helps us on with his ringing and stately versification, and Conington with his spirited short metres. Let us take as a favourite specimen, both of prose and verse, the celebrated panegyric on Marcellus, for which Augustus so generously rewarded his favourite laureate. Our space will permit only a short extract, but as a brick of the house it is a sort of testimony. The prose runs thus:

'Father Anchises began, tears gushing forth the while, "Alas, my son, ask not of the heavy grief which those of your blood must bear. Of him the Fates shall give but a glimpse to earth, nor suffer him to continue longer. Yes, powers of the sky! Rome's race would have been in your eyes too strong, had a boon like this been its own for ever. What groanings of the brave shall be wafted from Mars' proud field to Mars' mighty town! What a funeral, Father Tiber, shall thine eyes behold, as thou flowest past that new-built sepulchre! No child of the stock of Ilion shall raise his Latian ancestors to such heights of hope; never while time lasts shall the land of Romulus take such pride in any that she has reared. Woe for the piety, for the ancient faith, for the arm unconquered in battle! Never would foeman have met that armed presence unscathed, marched he on foot into the field, or tore with bloody spur the flank of his foaming steed. Child of a nation's sorrow! were there hope of thy breaking the tyranny of fate, thou shalt be Marcellus. Bring me handfuls of lilies, that I may strew the grave with their dazzling hues, and crown, if only with these gifts, my young descendant's shade, and perform the vain service of sorrow."'

Thus far Conington in prose—and very vigorous and picturesque it is; but his verse will have more attractions for the reader.

'The sire replies, while down his cheek
The tear-drops roll apace:
"Ah son! compel me not to speak
The sorrows of our race!
That youth the Fates but just display
To earth, nor let him longer stay:
With gifts like these for aye to hold
Rome's heart had e'en been overbold.
Ah! what a groan from Mars's plain
Shall o'er the city sound!
How wilt thou gaze on that long train,
Old Tiber, rolling to the main
Beside his new-made mound!
No youth of Ilium's seed inspires
With hope as fair his Latian sires:
Nor Rome shall dandle on her knee
A nursling so adorned as he.
O piety! O ancient faith!
O hand untamed in battle-scathe!
No foe had lived before his sword,
Stemmed he on foot the war's red tide,
Or with relentless rowel gored
His foaming charger's side.
Dear child of pity! shouldst thou burst
The dungeon-bars of Fate accurst,
Our own Marcellus thou!
Bring lilies here, in handfuls bring,
Their lustrous blooms I fain would fling:
Such honour to a grandson's shade
By grandsire hands may well be paid:
Yet, O! it 'vails not now."'

Surely, Virgil himself would prefer to be presented to the English mind in verse rather than in prose.

Gospel Types and Shadows of the Old Testament. By the Rev. William Odom. Nisbet and Co.

These Bible studies, each a likely skeleton for a Sunday sermon (they are fifty-two in number, suggesting a weekly exercitation), are the best shillingsworth a teacher or preacher can invest in, as full of religious knowledge and suggestiveness. From the notice paper of the first edition—this being the second—Mr. Odom's booklet has received hearty appreciation, and would appear to be a very useful synopsis of the Judaic Typology.

The Gospel of St. John. Intended for the use of Students preparing for Oxford and Cambridge Local and other examinations. By a Practical Teacher. London: T. Murby, Fleet Street.

This little manual has reached a new edition, and will be found a useful help to students of St. John's Gospel. It is explanatory rather than critical, and wisely leaves untouched several disputed points, including the verses of doubtful authenticity. As a help in rendering some of the old forms of expression agreeable to modern phraseology, the compiler has been successful and painstaking. Many lucid explanations are here given which would have to be hunted out of large and expensive commentaries. Such, for instance, as "Thou hast well said"—the expression Christ used to the woman of Samaria—meaning 'Thou hast truly or rightly said;' also 'which of you convinceth me of sin' is better rendered as the author says, 'convicteth me of any sin.' In some passages, however, we should prefer the original, without imputing to the author any bias. His honesty and fairness are evident throughout. In some passages we have the revised version referred to by way of explanation. Altogether the work cannot fail to be useful.

The British School Atlas of Ancient and Modern Geography. London and Edinburgh: Gall and Inglis.

This useful collection of thirty-four maps, imperial quarto, is accompanied by an excellent index of no less than 20,000 names, including the principal towns of the world, down to such places as Uxbridge, Dorking, Worthing, etc. The maps are printed in colours and remarkably full, but sufficiently clear withal to avoid confusion. Combining, as this atlas does, the essential features of ancient as well as extensive details of modern geography, it cannot fail to be useful to most students. In the map of England and Wales the hills, rivers, and towns are named in addition to the coast features, the railways being wisely omitted as being too confusing for this map. In the map of England, however, occupying the north-western portion of Central Europe, the principal railway lines are clearly marked, without militating against the general clearness of the mad.

Stories from English History. A Reading Book for Standard III. London: T. Nelson and Sons.

We congratulate the publishers of the famous Royal Series upon the issue of this introductory historical reading book. In all respects it is a really excellent work. No mere theorist could possibly have compiled it; evidences of the hand of the *practical* teacher appear on every page.

Simply and interestingly written, superbly illustrated, printed and bound in faultless style, and well within the grasp of Standard III. children, these 'Stories from English History' should command an extensive sale.

Query Column.

☞ As the answer to a single question often entails an expense six or seven times greater than the cost of the complete key to any of the Arithmetics or Algebras ordinarily used, the Proprietor of this Journal would be glad if students confined themselves to questions, the full working of which is not published in the form of a 'key.'

RULES.

1. Each correspondent is restricted to *one question.* We should be much obliged if correspondents who send numerical or algebraical questions for solution, and are able from any source to give the required answer, would do so. It would save much time at present spent on verification.

2. No query can be answered unless accompanied by the real name and address of the sender, not necessarily for publication, but as a guarantee of good faith and for facility of reference.

3. Replies will not be sent through the post.

4. Correspondents are requested to write *legibly*, and on one side of the paper only.

5. Correspondents wishing us to recommend books for any (other than the ordinary Government) Examinations, or to answer any questions concerning that Examination, must, in all cases, send a copy of Regulations up to date.

6. Queries must reach the office *not later than the 15th of the month*, or they cannot be attended to in the following issue.

7. All queries in future must have a pseudonym, and must be written on a slip of paper other than that which bears the real name and address of the sender.

*** All communications for this column should be addressed

'The Query Editor,'
The Practical Teacher,
Pilgrim Street, Ludgate Hill,
London, E.C.

Arithmetic.

1. 2ND YEAR P. T.—Simplify

$$\frac{\frac{3}{11}+\frac{1}{11}+\frac{3}{11}-\frac{1}{3}}{\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}} \text{ of } \frac{4\times\frac{3}{1\frac{1}{2}}-\frac{4}{3\frac{1}{2}}\times\frac{2\frac{1}{2}}{1\frac{1}{2}}}{\frac{3}{10}\times\frac{11}{7}\times 3\frac{1}{2}+2\frac{1}{10}\times 1\frac{1}{6}\times\frac{1}{19}}$$

(Brook Smith.)

$$\frac{\frac{3}{11}+\frac{1}{11}+\frac{3}{11}-\frac{1}{3}}{\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}} \text{ of } \frac{4\times\frac{3}{1\frac{1}{2}}-\frac{4}{3\frac{1}{2}}\times\frac{2\frac{1}{2}}{1\frac{1}{2}}}{\frac{3}{10}\times\frac{11}{7}\times 3\frac{1}{2}+2\frac{1}{10}\times 1\frac{1}{6}\times\frac{1}{19}}$$

$$= \frac{\frac{210+55+120-231}{1155}}{\frac{20+15+12+10}{60}} \text{ of } \frac{\frac{4}{1}\times\frac{3}{10}-\frac{\cancel{4}^{2}}{1}\times\frac{5}{2}}{\frac{7}{\cancel{3}}\times\frac{9}{7}\times 2+\frac{\cancel{11}}{\cancel{5}}\times\frac{3}{37}\times\frac{\cancel{11}}{\cancel{3}}\times\frac{1}{19}}$$

$$= \frac{\frac{385-231}{1155}}{\frac{57}{60}} \text{ of } \frac{\frac{7}{2}\times\frac{27}{10}-\frac{\cancel{3}}{\cancel{5}}\times\frac{\cancel{3}}{\cancel{5}}}{\frac{3}{38}+\frac{37}{190}}$$

$$= \frac{\frac{\cancel{154}^{2}}{\cancel{114}\cancel{57}}}{\frac{57}{\cancel{5}\cancel{5}}} \text{ of } \frac{\frac{189}{20}-\frac{9}{4}}{\frac{15+37}{190}}$$

$$= \frac{8}{57} \text{ of } \frac{\frac{189-45}{20}}{\frac{52}{190}}$$

$$= \frac{8}{57} \text{ of } \frac{\frac{\cancel{144}\ 72\ 18}{\cancel{5}\cancel{2}}}{\frac{\cancel{5}\cancel{2}}{19\cancel{5}}\ 13}$$

$$= \frac{8}{\cancel{57}} \text{ of } \frac{\cancel{144}\ 6}{13}$$

$$= \frac{48}{13}$$

$$= 3\tfrac{9}{13}. \text{ Ans.}$$

2. SUBSCRIBER.—If a certain number of workmen can do a piece of work in 25 days, in what time will $1\frac{2}{3}$ of that number do a piece of work twice as great, supposing two of the first set can do as much work in an hour as 3 of the second set can do in $1\frac{1}{2}$ hours, and that the second set work half as long a day as the first set? *(Barnard Smith.)*

$$\left.\begin{array}{l} 1\frac{2}{3} : 1 \\ 1 : 2 \\ 2 : 3 \\ 1 : 1\frac{1}{2} \\ 1 : 2 \end{array}\right\} \text{ days } :: 25 : \text{Time.}$$

$$= \frac{3\times\cancel{2}\times 3\times 3\times\cancel{2}\times\cancel{5}^{5}}{\cancel{5}\times\cancel{2}\times\cancel{2}} \text{ days.}$$

$$= \underline{135 \text{ days.}} \text{ Ans.}$$

3. T. D.—The weights of equal quantities of lead and cork are as 11·324 : ·24; and 60 cubic inches of lead, with 54 of cork, weigh as much as 1,538⅜ of fir; what number represents proportionately the weight of fir? *(Colenso.)*

If the weight of 60 cub. in. lead be represented by 11·324,
Then " " " of cork " ·24,
And " 54 " " " $\frac{\cdot 24\times 54}{60}$
$= \cdot 216$;

∴ The weight of 60 cub. in. of lead and 54 cub. in. of cork, or the weight of 1,538⅜ cub. in. of fir, is represented by
$11\cdot 324 + \cdot 216$
$= 11\cdot 54$;

∴ The weight of 60 cub. in. of fir is represented by
$$\frac{11\cdot 54\times 60}{1538\frac{3}{8}}$$
$$= \frac{692\cdot 4\times 3}{4616}$$
$$= \frac{2077\cdot 2}{4616}.$$
$$= \underline{\cdot 45.} \text{ Ans.}$$

4. SCHOLARSHIP.—Find the cost of desk accommodation for a school of 168 children at 3s. 6d. per linear foot, each child requiring 21·75 inches; find also the average space in square feet per child if the room contains 8 equal groups of desks, three deep, each group occupying 152·25 square feet, with 8 gangways occupying 288 square feet, and a space of 10 feet is left clear in front of the desks. *(Scholarship, 1880.)*

Desk accommodation = 21·75 in. × 168

$$= \frac{87 \times 42}{44} \text{ ft.}$$

$$= \frac{261}{2} \text{ ft.}$$

$$\text{Cost} = (130\tfrac{1}{2} \times \tfrac{7}{2})\text{s.}$$

$$= \tfrac{913}{4}\text{s.}$$

$$= \underline{£53\ 5\text{s. } 9\text{d.}} \quad \text{Ans.}$$

Length of each desk = $\frac{261}{11}$ ft. ÷ 24

$$= \tfrac{261}{264} \text{ ft.}$$

Breadth occupied by desks = $152\tfrac{1}{2}$ sq. ft. ÷ $\frac{305}{176}$ ft.

$$= \left(\frac{305}{4} \times \frac{176}{305}\right) \text{ft.}$$

$$= 12 \text{ ft.}$$

∴ Breadth of room = (12 + 10) ft. = 22 ft.

Width of a gangway = $\frac{264}{11}$ sq. ft. ÷ 12 ft.

$$= (36 \div 12) \text{ ft.}$$

$$= 3 \text{ ft.}$$

∴ Length of room = $\{(\frac{264}{11} + 3) \times 8\}$ ft.

$$= 216 \text{ ft.}$$

Area of room = ($19\tfrac{1}{11} \times 22$) sq. ft.

$$= 2761 \text{ sq. ft.}$$

∴ Space per child = $\frac{2761}{168}$ sq. ft.

$$= \underline{16{\cdot}434\ldots \text{sq. ft.}} \quad \text{Ans.}$$

5. IGNORANS.—A bankrupt has book-debts equal in amount to his liabilities, but on £6000 of them he can only recover 13s. 4d. in the pound, and the expenses of the bankruptcy are 5 per cent. on the book-debts; if he pay 13s. in the pound what is the amount of his liabilities? (*Barnard Smith.*)

The expenses of bankruptcy are 5 per cent. on the book-debts;

∴ Every pound is subject to a deduction of 1s. for expenses.

On £6000 only 13s. 4d. in the pound is realized, and therefore only 12s. 4d. in the pound is available for the creditors.

The creditors receive 13s. in the pound, and therefore (8d. × 6000) or £200 is required from the other debts to make up this deficiency.

The other debts are paid in full, and therefore there is a balance of 6s. on every pound of debt paid in full.

s. £ £

∴ 6 : 200 :: 1 : Amount of debts paid in full.

20

4000

£666 13s. 4d.

∴ Amount of liabilities = £6,666 13s. 4d. Ans.

6. CLARA.—A train 88 yards long overtook a person walking along the line at the rate of 4 miles an hour, and passed him completely in 10 seconds. It afterwards overtook another person, and passed him in 9 seconds. At what rate per hour was the second person walking?

Dist. walked by 1st person in 10 sec. = $\left(\frac{1}{88} \text{ of } 4 \times 1760 \text{ yds.}\right)$

$$= 1\tfrac{3}{8}\text{ yds.}$$

$$= 19\tfrac{3}{8} \text{ yds.}$$

Dist. travelled by train in 10 sec. = (88 + 19⅜) yds.

$$= 107\tfrac{3}{8} \text{ yds.}$$

" " " " " 9 " = ($107\tfrac{3}{8} \times \frac{9}{10}$) yds.

$$= \tfrac{963}{8} \text{ yds.}$$

$$= 96\tfrac{3}{8} \text{ yds.}$$

∴ Dist. walked by 2nd person in 9 " = ($96\tfrac{3}{8} - 88$) yds.

$$= 8\tfrac{3}{8} \text{ yds.}$$

∴ Rate per hour of 2nd person = $\left(8\tfrac{3}{8} \times \frac{60 \times 60}{9}\right)$ yds.

$$= \left(\frac{67}{8} \times \frac{40}{1760}\right) \text{ miles.}$$

$$= \underline{2 \text{ miles.}} \quad \text{Ans.}$$

7. MAGISTER.—The discount due on a certain sum, due 9 months hence, is £20, and the interest on the same sum for the same time is £20 15s. Find the sum and the rate of interest.

Let S = Sum
R = Rate per cent.
I = Interest
D = Discount.

$$\left.\begin{aligned} \text{Then } I &= S \times \frac{\frac{3}{4}R}{100} \\ D &= S \times \frac{\frac{3}{4}R}{100 + \frac{3}{4}R} \end{aligned}\right\}$$

$$\left.\begin{aligned} I \times \frac{100}{\frac{3}{4}R} &= S \\ D \times \frac{100 + \frac{3}{4}R}{\frac{3}{4}R} &= S \end{aligned}\right\}$$

$$\therefore I \times \frac{100}{\frac{3}{4}R} = D \times \frac{100 + \frac{3}{4}R}{\frac{3}{4}R}$$

$$I \times 100 = D \times (100 + \tfrac{3}{4}R)$$

$$I \times 100 - D \times 100 = D \times \tfrac{3}{4}R$$

$$(I - D) \times 100 = D \times \tfrac{3}{4}R$$

$$\therefore (£20\ 15\text{s.} - £20) \times 100 = £20 \times \tfrac{3}{4}R$$

$$\tfrac{3}{4} \times 100 = 20 \times \tfrac{3}{4}R$$

$$100 = 20R$$

$$\therefore R = 5.$$

$$S = I \times \frac{100}{\frac{3}{4}R} = £20\tfrac{3}{4} \times \frac{100}{\frac{15}{4}}$$

$$= £20\tfrac{3}{4} \times \tfrac{80}{15} = \tfrac{1660}{60}\,£ = \underline{£553\ 6\text{s. } 8\text{d.}}$$

∴ Sum = £553 6s. 8d., and rate of interest = 5 per cent.

8. W. PREST.—A cistern has two supplying pipes, A and B, the former of which could fill it in 51 minutes; and it can be emptied by a tap, C, in 76 minutes. The cistern is empty, and A and B are turned on and run together for 8½ minutes; A is then turned off and C is turned on; and 16 minutes afterwards B is shut and A re-opened; and when A has run with C for 13⅔ minutes, C alone runs for 36 minutes more, and then the cistern is again empty. In what time could B alone fill the cistern?

Time A was open = ($8\tfrac{1}{2} + 13\tfrac{2}{3}$) min. = $22\frac{1}{10}$ min.

" B " " = ($8\tfrac{1}{2} + 16$) min. = $24\tfrac{1}{2}$ min.

" C " " = ($16 + 13\tfrac{2}{3} + 36$) min. = $65\frac{2}{3}$ min.

Part filled by A in 1 min. = $\frac{1}{51}$,

" " " $22\frac{1}{10}$ " = $\frac{1}{51} \times \frac{221}{10} = \frac{13}{30}$;

" emptied by C in 1 " = $\frac{3}{760}$,

" " " $65\frac{2}{3}$ " = $\frac{1}{760} \times \frac{197}{5} = \frac{82}{95}$;

∴ Part filled by B in $24\frac{1}{2}$ " = $\frac{82}{95} - \frac{13}{30}$

$$= \frac{492 - 247}{570}$$

$$= \tfrac{245}{570}$$

$$= \tfrac{49}{114},$$

∴ Part filled by B in 1 min. = $\frac{49}{114} \div 24\frac{1}{2}$

$$= \frac{49}{114} \times \frac{2}{49}$$

$$= \tfrac{1}{57};$$

∴ B could fill the cistern in 57 minutes. Ans.

9. ALPHA.—A wall is to be built to the height of 27 feet, and it is known that each successive 9 feet in height takes twice as long to build as the preceding 9 feet. In six days 12 men raise it to 9 feet; how many must be employed to finish it in four days more?

12 men can raise the first 9 ft. in 6 days,

" " second " " 12 "

" " third " " 24 "

∴ 12 men could complete it in 36 days;

∴ No. of men required to complete it in 4 days = $\frac{12 \times 36}{4}$

$$= \underline{108.} \quad \text{Ans.}$$

Algebra.

1. EXCELSIOR.—A certain company of soldiers can be formed into a solid square; a battalion consisting of seven such equal companies can be formed into a hollow square, the men being four deep. The hollow square formed by the battalion is sixteen times as large as the solid square formed by one company. Find the number of men in the company. (*Todhunter.*)

Let x = No. of men in a side of the company,

Then x^2 = " " " the company;

And $7x^2$ = " " " " battalion.

As the hollow square formed by the battalion is 16 times as large as the solid square formed by one company,

$\therefore$ No. of men in a side of the battalion = 4 times No. of men in a side of a company,

$= 4x$.

No. of men in the battalion (hollow square)

$= 4x \times 4 \times 2 + \{(4x-8) \times 4 \times 2\}$

$= 32x + 8(4x-8)$

$= 32x + 32x - 64$

$= 64x - 64$.

$\therefore 7x^2 = 64x - 64$

$7x^2 - 64x = -64$

$x^2 - \frac{64x}{7} = -\frac{64}{7}$

$x^2 - \frac{64x}{7} + \left(\frac{32}{7}\right)^2 = \frac{1024}{49} - \frac{64}{7}$

$= \frac{1024 - 448}{49}$

$= \frac{576}{49}$

$x - \frac{32}{7} = \frac{24}{7}$

$x = \frac{24}{7} + \frac{32}{7}$

$\therefore \underline{x = 8}$

$\therefore$ No. of men in the company $= \underline{64}$. Ans.

2, OGLEY HAY.—Find the value of $\frac{x}{y}$ in the following equation :—

$$\frac{x^{2n} - ay^{2n}}{x^{2n} + ay^{2n}} = \frac{x^n - b(x-y)^n}{x^n + b(x-y)^n}$$

$$\frac{x^{2n} - ay^{2n}}{x^{2n} - ay^{2n}} = \frac{x^n - b(x-y)^n}{x^n + b(x-y)^n}$$

$$\frac{2x^{2n}}{2ay^{2n}} = \frac{2x^n}{2b(x-y)^n}$$

$$\frac{x^{2n}}{ay^{2n}} = \frac{x^n}{b(x-y)^n}$$

$$\frac{x^{2n}}{y^{2n}} = \frac{a}{b} \times \frac{x^n}{(x-y)^n}$$

$$\frac{x^2}{y^2} = \left(\frac{a}{b}\right)^{\frac{1}{n}} \times \frac{x}{x-y}$$

$$\frac{x^2}{y^2} \times \frac{x-y}{x} = \left(\frac{a}{b}\right)^{\frac{1}{n}}$$

$$\frac{x(x-y)}{y^2} = \left(\frac{a}{b}\right)^{\frac{1}{n}}$$

$$\frac{x^2 - xy}{y^2} = \left(\frac{a}{b}\right)^{\frac{1}{n}}$$

$$\frac{x^2}{y^2} - \frac{x}{y} = \left(\frac{a}{b}\right)^{\frac{1}{n}}$$

$$\frac{x^2}{y^2} - \frac{x}{y} + \left(\tfrac{1}{2}\right)^2 = \left(\frac{a}{b}\right)^{\frac{1}{n}} + \tfrac{1}{4}$$

$$\frac{x}{y} - \tfrac{1}{2} = \pm \sqrt{\left(\frac{a}{b}\right)^{\frac{1}{n}} + \tfrac{1}{4}}$$

$$\therefore \underline{\frac{x}{y} = \tfrac{1}{2} \pm \sqrt{\left(\frac{a}{b}\right)^{\frac{1}{n}} + \tfrac{1}{4}}}$$

3. W. R.—A mixed train of m passengers being supposed to realize n guineas to its proprietors as the gross proceeds of an excursion, assuming the proportions of the class fares to be p, q, r, and those of the corresponding receipts to be a, b, c, determine the number of the passengers and the fare for each class.

(a) Let x, y, z = No. of 1st, 2nd, and 3rd-class passengers, respectively;

Then, (1) $x + y + z = m$

(2) $x = y \times \frac{q}{p} \times \frac{a}{b}$

(3) $x = z \times \frac{r}{p} \times \frac{a}{c}$

(2) $x = \frac{aqy}{bp}$, $\therefore y = \frac{bpx}{aq}$;

(3) $x = \frac{arz}{cp}$, $\therefore z = \frac{cpx}{ar}$.

(1) $x + \frac{bpx}{aq} + \frac{cpx}{ar} = m$

$$\frac{(aqr + bpr + cpq)\,x}{aqr} = m$$

$$\therefore x = \frac{amqr}{aqr + bpr + cpq};$$

$$y = \frac{bpx}{aq}$$

$$= \frac{bmpr}{aqr + bpr + cpq};$$

$$z = \frac{cpx}{ar}$$

$$= \underline{\frac{cmpq}{aqr + bpqr + cpq}}.$$

(b) Again, let x, y, z = Fares of 1st, 2nd, and 3rd classes, respectively;

Then, (1) $\frac{amqrx + bmpry + cmpqz}{aqr + bpr + cpq} = n$

(2) $x = y \times \frac{p}{q}$

(3) $x = z \times \frac{p}{r}$

(2) $x = \frac{py}{q}$, $\therefore y = \frac{qx}{p}$;

(3) $x = \frac{pz}{r}$, $\therefore z = \frac{rx}{p}$.

(1) $$\frac{amqrx + \left(bmpr \times \frac{qx}{p}\right) + \left(cmpq \times \frac{rx}{p}\right)}{aqr + bpr + cpq} = n$$

$$\frac{mqr\,(a+b+c)\,x}{aqr + bpr + cpq} = n$$

$$\therefore x = \frac{n\,(aqr + bpr + cpq)}{mqr\,(a+b+c)};$$

$$y = \frac{qx}{p}$$

$$= \frac{n\,(aqr + bpr + cpq)}{mpr\,(a+b+c)};$$

$$z = \frac{rx}{p}$$

$$= \underline{\frac{n\,(aqr + bpr + cpq)}{mpq\,(a+b+c)}}.$$

4. SEDGEMOOR.—Solve the following equation fully :—

$5(x-2)^2 + 7(x-3)^2 = (3x-7)(4x-19) + 42$.

$5(x-2)^2 + 7(x-3)^2 = (3x-7)(4x-19) + 42$

$5(x^2 - 4x + 4) + 7(x^2 - 6x + 9) = 12x^2 - 85x + 133 + 42$

$5x^2 - 20x + 20 + 7x^2 - 42x + 63 = 12x^2 - 85x + 175$

$-62x + 83 = -85x + 175$

$85x - 62x = 175 - 83$

$23x = 92$

$\therefore \underline{x = 4}$.

5. F. G. ROBINSON, Kirkham.—A goods train travels at the rate of 8 miles an hour on a railway; at the end of 12 hours it meets a passenger train travelling in the opposite direction, which arrives at the original starting station 16 hours after the goods train left. At what rate is the passenger train travelling? (*Scholarship*, 1871.)

Let x = rate of passenger train;

As it arrives 16 hrs. after the goods train left, it takes 4 hrs. to reach the station;

Then $4x$ = No. of miles travelled by passenger train after meeting goods train;

But this distance = (8×12) mls. = 96 mls.

$4x = 96$

$\therefore \underline{x = 24}$.

$\therefore$ Passenger train is travelling at the rate of 24 miles an hour.

6. DEVONIAN.—Solve—$x^3 - 6x^2 + 11x = 0$.

$x^3 - 6x^2 + 11x = 0$

$x(x^2 - 6x + 11) = 0$

$x^2 - 6x + 11 = 0$

$x^2 - 6x = -11$

$x^2 - 6x + (3)^2 = 9 - 11$

$= -2$

$x - 3 = \pm \sqrt{-2}$

$\therefore \underline{x = 3 \pm \sqrt{-2}}$.

$\therefore x = 0,\ 3 \pm \sqrt{-2}$.

7. (WYDDGRUG), CYMRU.—A man starts on a journey on foot, and walks three miles an hour. Two hours later his friend follows him on horseback and rides 7 miles an hour. Where will the latter overtake the former? (*Scholarship*, 1873.)

Let x = No. of hours after second starts when he overtakes the first;

Then $7x$ = distance travelled by second,

And $3(x+2)$ = " " " first.

$\therefore 7x = 3(x+2)$

$7x = 3x+6$

$7x - 3x = 6$

$4x = 6$

$\therefore x = 1\frac{1}{2}$.

$\therefore$ Second overtakes first $(1\frac{1}{2} \times 7)$ miles, or $10\frac{1}{2}$ miles from starting-point.

General.

1. FAIRPLAY.—The expression 'breathing out oxygen' is lamentably inaccurate. Green parts of plants have a two-fold action in regard to the air. (1) They breathe. (2) They feed.

(1) *Respiration.*—In this process plants, as animals, take in oxygen that serves later on for that combustion of their tissues that always accompanies work. In this process also carbon dioxide is given out as the result of the combustion of the tissues.

(2) *Feeding.*—In this process plants take in carbon dioxide as food, keep its carbon, and give out its oxygen. But this is not a respiratory giving out of oxygen. We might as accurately say that when a man drinks champagne he 'breathes in' carbon dioxide. The error as to the 'breathing out oxygen" by plants has arisen from the fact that the feeding process in plants is far in excess of the breathing, so that the *total* effect, but never the respiratory effect of vegetables on the air, is the giving out of oxygen.

The stomata, despite the phrase of our friend Prof. Tanner, are regulators of transpiration rather than breathing apparatus. The whole general surface of the plant that is in contact with the air breathes. On page 84 of 'Vine's Translation of Prantl's Botany' it is written:—

'The stomata affect the transpiration of the plant inasmuch as they are the external openings of the intercellular spaces into which transpiration takes place from the neighbouring cells, and from which the watery vapour escapes into the external air.'

2. C. MILNE.—Your question was solved in our last issue. See No. 4 of the Arithmetical Queries.

3. T. H. B.—The solution of your query is given in the April No. Please state what parts of it you cannot understand, and we will endeavour to explain them more fully.

4. TURBATOR.—We advise you to accept the post of Assistant Junior Master in the Grammar School.

5. CONSTANT SUBSCRIBER.—You must remember that the statement in the ready reckoners of 2 inches 8 parts means $\frac{8}{12}$ ft. $+ \frac{2}{12 \times 12}$ ft. $= \frac{32}{144}$ ft., and as in the case given it is cubic measure, $\frac{32}{144}$ cub. ft. $= 384$ cub. in. This agrees with the answer derived by the other method. By cross multiplication, 8 ft. $\times$ 2 in. $= 16$ in.; 16 in $\times$ 2 parts $= 32$ parts $= 2$ in. 8 parts.

6. MEMO.—Antoine's Practical French Verb Book (Hughes) 6d., or Chardenal.

7. W. J. P.—The two words are exactly the same in meaning, but some people prefer the 'x' to 'ct' because the former is more in accordance with the Latin word from which it is derived.

8. UNDERGRADUATE.—Hamblin Smith's.

9. DOUBTFUL.—Your extract is too long for analysis.

10. BONA FIDE.—You will find the solution of your query in the April Number.

11. LANCASTRIAN.—In the sentence—'The man saw a dog run across the lane,' *dog* is objective case by the verb *saw*, and *run* is in the infinitive mood, not indicative.

12. NOTTS.—No special Latin subject is selected for Scholarship Examination. Send for Syllabus of Matriculation Examination for French subject for June, 1883.

13. LILY.—Curtis's 'History,' 5s. 6d. (Simpkin & Co.), and Taylor's 'Notes of Lessons,' 1s. (Hughes).

14. EDITH.—Apply to Secretary, Civil Service Commissioners, Cannon Row, S.W.

15. J. B. MCLACHLAN.—1. The rule you give, though correct in most instances, does not hold good in all: ovis, nubes, dens, etc., though making the ablative singular in *e*, end in ium in the genitive plural. 2. The long *e* in Greek is pronounced as *ee* in English.

16. QUERIST.—Roscoe's 'Primer,' 1s. (Macmillan).

17. Q.—Apply to the Registrar of the University.

18. J. O'ROURKE.—1. and 2. Mansford's 'Mental Arithmetic,' 1s. 6d. (Hughes). 3. 'How to Compose,' 1s. (Hughes). 4. Savile's 'Guide to the Civil Service,' 3s. 6d. (Lockwood & Co.).

19. R. SMITH.—Amner's 'Guide to the Certificate and Scholarship Examinations,' 2s. 6d. (Moffatt & Paige).

20. WAMBA.—All the sides of two triangles touch the same circle; show that if their perimeters are equal, their areas are equal, and conversely. (Second Stage Mathematics, May, 1882.)

By Trigonometry,

Radius of the circle inscribed in a triangle $= \frac{S}{s}$ (where

S = area of triangle, and $s = \frac{1}{2}$ sum of sides of triangle).

Now as it is the same circle, the area of one triangle divided by $\frac{1}{2}$ perimeter = area of the other triangle divide by $\frac{1}{2}$ perimeter;

but the perimeters are equal; (Hyp.)

$\therefore$ Areas are equal.

Conversely, if the areas are equal, $\frac{1}{2}$ perimeter of one triangle $= \frac{1}{2}$ perimeter of the other triangle;

$\therefore$ Perimeters are equal.

Mensuration.

1. PENTAGON.—Find the edge and longest diameter of a cubical tank which contains 134,217,728 cubic inches. (*Scholarship*, 1880.)

Length of edge of tank $= \sqrt[3]{134,217,728}$ cub. in

134,217,728(512

125

$5^2 \times 300 = 750$ | 9217

$5 \times 1 \times 30 = 150$ |

$1^2 = 1$ |

7651 | 7651

$51^2 \times 300 = 780300$ | 1566728

$51 \times 2 \times 30 = 3060$ |

$2^2 = 4$ |

783364 | 1566728

$\therefore$ Length of edge of tank = 512 in. Ans.

If a = length of edge of tank,

Diameter of base $= \sqrt{2a^2}$

Longest diameter $= \sqrt{2a^2 + a^2}$

$= \sqrt{3a^2}$

$= \sqrt{3 \times 512^2}$

$= \sqrt{3 \times 262144}$

$= \sqrt{786432}$

78'64'32(886·8

64

168 | 1404

| 1344

1766 | 12032

| 10596

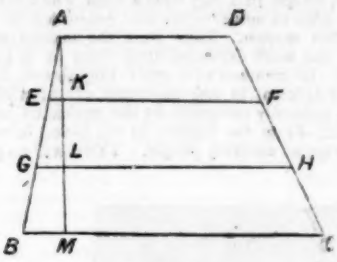
17728 | 143600

| 141824

1776

$\therefore$ Longest diameter = 886·8...in. Ans.

2. A. C. P.—The parallel sides of a trapezoid are respectively 8 ft. and 14 ft. Two straight lines are drawn across the figure parallel to these, so that the four are equidistant; find the lengths of the straight lines.



Draw AM perpendicular to the parallel sides.

$$\text{Area of ABCD} = \frac{AD+BC}{2} \times AM,$$

$$\text{,, ,, AEFD} = \frac{AD+EF}{2} \times AK,$$

$$\text{,, ,, EBCF} = \frac{EF+BC}{2} \times KM;$$

$$\therefore \left(\frac{AD+EF}{2} \times AK\right) + \left(\frac{EF+BC}{2} \times KM\right) = \frac{AD+BC}{2} \times AM$$

$$\left(\frac{8+EF}{2} \times \frac{AM}{3}\right) + \left(\frac{EF+14}{2} \times \frac{2AM}{3}\right) = \frac{8+14}{2} \times AM$$

$$\tfrac{1}{3}(8+EF) + \tfrac{2}{3}(EF+14) = 22$$

$$\tfrac{8}{3} + \tfrac{1}{3}EF + \tfrac{2}{3}EF + \tfrac{28}{3} = 22$$

$$EF + 12 = 22$$

$$\therefore \underline{EF = 10}.$$

Similarly,

$$\left(\frac{AD+GH}{2} \times AL\right) + \left(\frac{GH+BC}{2} \times LM\right) = \frac{AD+BC}{2} \times AM$$

$$\left(\frac{8+GH}{2} \times \frac{2AM}{3}\right) + \left(\frac{GH+14}{2} \times \frac{AM}{3}\right) = \frac{8+14}{2} \times AM$$

$$\tfrac{2}{3}(8+GH) + \tfrac{1}{3}(GH+14) = 22$$

$$\tfrac{16}{3} + \tfrac{2}{3}GH + \tfrac{1}{3}GH + \tfrac{14}{3} = 22$$

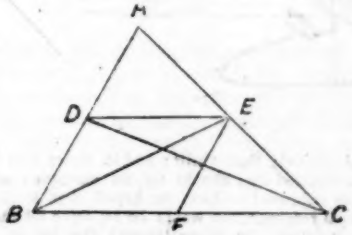
$$GH + 10 = 22$$

$$\therefore \underline{GH = 12}.$$

$\therefore$ Lengths of the straight lines = 10 ft. and 12 ft. Ans.

Geometry.

1. N. WATSON.—The straight line which bisects two sides of a triangle is parallel to the third side, and equal to one half of it.



Let D, E be the middle points of the sides AB, AC of the triangle ABC.

Then the straight line DE shall be parallel to BC, and equal to half of it.

Bisect BC in F, and join EF, BE, CD.

Proof—$\triangle BDE = \triangle ADE$, (I. 38.)

$\triangle CED = \triangle AED$, ,,

$\therefore \triangle BDE = \triangle CED$; (Ax. 1.)

Wherefore DE is parallel to BC. (I. 39.)

Similarly, it can be proved that EF is parallel to AB;

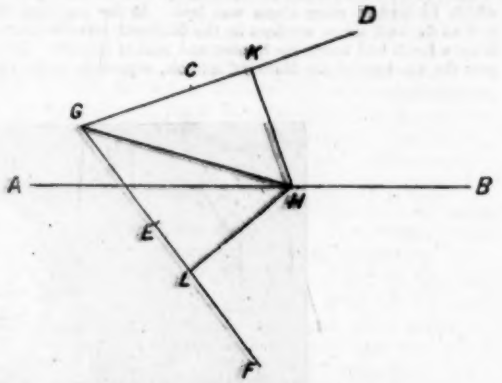
$\therefore$ DBFE is a parallelogram;

Wherefore DE = BF; (I. 34.)

but BF is half of BC;

Wherefore DE is equal to half BC. Q.E.D.

2. FOLKESTONIAN.—In a given straight line find a point such that the perpendiculars drawn from it to two given straight lines shall be equal.



Let AB, CD, EF be the three given straight lines.

Produce DC, FE, and let them meet in G.

Bisect the angle DGF by the straight line GH (I. 9), meeting AB in H.

Then H is the required point in AB.

From H draw HK, HL perpendicular to CD, EF, respectively. (I. 12.)

Proof.—In the triangles KGH, LGH,

$\angle KGH = \angle LGH$, (Con.)

$\angle HKG = \angle HLG$, (Ax. 11.)

and side GH is common to the two triangles, $\therefore$ side HK = side HL. (I. 26.) Q.E.F.

Note.—If the two given lines are parallel, bisect the *distance* between them.

3. INCOGNITO.—Construct a parallelogram equal to a pentagon, or any polygon.

Construction.—Divide the rectilineal figure into three, four, etc., triangles, as the case may be, and then the third, fourth, etc., triangles may be applied in the same way as the second (I. 45), until the required parallelogram is obtained.

Note.—Rectilineal figures are those contained by straight lines. It does *not* mean four straight lines, but *any* number. Those contained by four straight lines are termed *quadrilaterals*.

Your simpler method of proving No. 3 Geometrical Query in our last issue is *entirely wrong*.

You say, $\angle BDF = \angle ADE$,

Add to each $\angle AED$,

$\therefore$ $\angle$s AED, ADE = $\angle$s ADE, BDF;

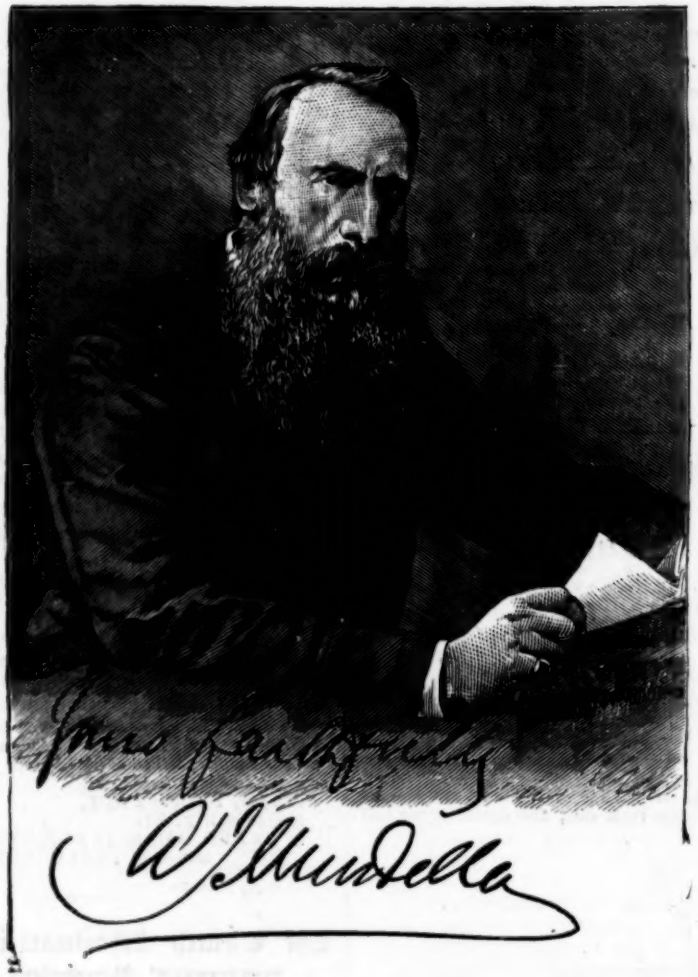
instead of $\angle$s AED, BDF.

The Church Schoolmasters' and Schoolmistresses' Benevolent Institution.

MR. MUNDELLA ON THRIFT.

THE twenty-fifth annual general meeting of the subscribers and friends of the Church Schoolmasters' and Schoolmistresses' Benevolent Institution was held (after a special service at St. Margaret's Church, Westminster) at the National Society's rooms, Broad Sanctuary, on the 20th of May. There was a crowded attendance, which was presided over by the Right Hon. A. J. Mundella, M.P. (Vice-President of the Committee of Council on Education). Mr. Mundella, in moving a resolution expressing approval of the society's work, said that while he had only recently become aware of the existence of the society, he found that it was doing such a good work that he should be glad to give it substantial aid by becoming a subscriber. There were few present, however familiar they might be with the

misfortunes which occasionally befell teachers—loss of life, loss of eyesight, their being stricken down sometimes suddenly by death, with orphans left behind—who could know more of the misfortunes than he had learned during his short experience at the Privy Council. His official position gave him an admirable insight into the position of teachers all over the kingdom. He had had to go through 500 or 600 applications for pensions and gratuities, so that he knew pretty well the claims teachers had upon the laity generally. It was very satisfactory that the friends of the society did so much for themselves. That was a point on which he wished more stress was laid. In the past they had had to do with many teachers in the National schools, because those schools had borne the burden and heat of the day. In the past the teachers of the National schools, especially in the rural districts, had to do a great amount of work for a very small remuneration. Upon investigating the cases of a number of old teachers, many of whom had served even fifty years as teachers, and were past three score and ten years, he was surprised to find that some were receiving a remuneration scarcely sufficient for bare subsistence. That was compensated for to some extent by their social status and by their knowledge that they were doing a good work; but certainly their remuneration was below that received by many an artisan. He was glad to know that education was not only more appreciated, but that the teachers' services were now better paid. He found that during the past ten years the teachers, both male and female, of the National Society, for instance, had benefited to an extent of nearly twenty per cent. increase upon the average earnings. There were to-day 18,130 certificated teachers employed by the National Society. The average earnings of schoolmasters in 1870 were £95 12s. 9d.; to-day they were £114 8s. 10d.; and schoolmistresses in 1870 earned an average of £57 16s. 5d.; and to-day £66 19s. 5d. No doubt even now there was room for considerable improvement in many cases. As to teachers as a body, he felt that they were a class which was doing more than any other to influence the next generation of English men and English women. They were the makers of the future England, and much depended upon them as to how it should be made. In common with other Englishmen, he was afraid they were deficient in one important characteristic, which he found so generally possessed by the profession in Scotland—viz., thrift. From the highest to the lowest he was afraid the English were an unthrifty people. There was no greater virtue they could cultivate than thrift; and in order that it might be properly cultivated they should set an example; and as they obtained an improved position he hoped that some portion of the increased remuneration would be set aside for the rainy day whenever it came. In going through the list of the many claimants upon the small fund at the disposal of the Education Department for pensions and gratuities, he had been struck with some strange things. First came the number of teachers among the applicants who had no means whatever to provide for the evil day. Then some of those who had the least to fall back upon were those who had lived in towns and had the highest salaries. The English teachers who had been the most thrifty were the teachers of the rural districts who had the smallest salaries. But there was one class of teachers who always had something to fall back upon, and those were the



Scotch teachers. What the Scotch teachers could do the English teachers could do. What he wished was that when teachers arrived at three score years, and could no longer discharge their duties satisfactorily to the children, the managers, and themselves, they should have a fair income to fall back upon. They ought to have it, and he trusted that they would. In the meantime he expressed his satisfaction that there was that Benevolent Institution in existence, which did a great and good work, and very often at the time of great affliction and necessity, when the teacher was broken down and exhausted, he was so aided that he was enabled to tide over his difficulties for a few months until he recovered his health and position. Mr. Mundella then quoted some statistics to show the progress of the institution from its commencement twenty-five years ago, and said that although the funds had greatly increased they were utterly inadequate to meet the many claims made upon the committee. The number of teachers increased in a greater ratio than the subscriptions. He should be glad if he could announce that some organized effort was made—not Government help, for they should help themselves—but he would like to see some organized system by an actuarial payment, so that all teachers might secure a certain sum in case of sickness, and when they reached the age when they ought to retire from the profession. He was not quite prepared to state how that could be done, but if any one had a definite idea on the subject he hoped they would communicate with others in the profession, and formulate some scheme which could be adopted for their benefit.

Gossip.

A FEW evenings ago we 'assisted' at a rather novel exhibition, held in the schoolroom adjoining the church, Upper Norwood, of which the Rev. S. A. Tipple is the pastor. It appears that last autumn an effort was made by Mr. J. Elliot Viney to induce the young people attending the church to turn to good account the long evenings of the coming winter. Practical help was promised to any boy or girl who chose to seek it. For this purpose one night a week was set apart, and little fingers that had essayed for the first time modelling in plaster, carving, carpentering, drawing, mapping, crocheting, etc., etc., were taught how to do their work skilfully. The exhibition, which was a pronounced success, was as varied as it was interesting, and it is a pleasure to add that every article was sold. The numerous pretty bouquets of wild-flowers, which adorned the tables, were sent on the following day to gladden the hearts of the inmates of a children's hospital. We congratulate Mr. Elliot Viney on his success, and trust his example will stimulate others to 'go and do likewise.'

⁂

Messrs. Griffith and Farran have a series of school reading-books in preparation which are intended to meet the requirements of the new Mundella Code. They are being edited by the compiler of 'Poetry for the Young,' and will be entitled 'Standard Authors Readers.'

⁂

We understand that the National Society has made a special grant of £500 to the proposed Training College for mistresses in East London.

⁂

A stained-glass window has been presented to St. Margaret's Church, Westminster, as a memorial to Sir Walter Raleigh, who is interred near the altar. The expense has been borne by American citizens, and Mr. J. R. Lowell, the celebrated poet, and American Minister in London, wrote the lines which are inscribed underneath :—

'The New World's sons, from England's breast we drew
Such milk as bids remember whence we came;
Proud of her past, wherefrom our present grew,
This window we inscribe with Raleigh's name.'

The window was unveiled at morning service on the 14th May.

⁂

Mr. Robert Browning attained his seventieth birthday on the 7th ult., and was presented by the seven Browning Societies of London, Oxford, Cambridge, Cornell, Bradford, Cheltenham, and Philadelphia, with a set of his own works, bound in olive morocco by Proudfoot, and enclosed in a handsome oak case carved with Browning emblems. The works were accompanied by a message that, as the works of a great modern poet could never be found in his own house (Mr. Browning always gives away all his own copies to friends), the societies begged his acceptance of a set of these works, and assured him that they would be found worthy his serious attention. The poet has since replied that he 'was never so honoured, so gratified, by any action of a similar nature that ever happened to him in the course of his life.'

⁂

The English Report, to be read at the forthcoming International Literary Congress at Rome, has been prepared, and will be presented to the Congress by the Hon. Howard Spensley and Dr. J. P. Steele, the delegates from this country.

⁂

Mr. J. S. Fletcher's new volume of poems will be published early this month by Mr. William Poole.

⁂

Mr. Alexander Gardner, well known for the good style in which his publications are sent forth, has recently issued a volume of selections from the writings of John Smith, who lived at Cambridge in the seventeenth century. The book, which has a capital introduction by Mr. Matthew Arnold, is entitled *The Natural Truth of Christianity*, and is really well worth reading

⁂

Ornithologists, who have not yet had an opportunity of seeing a perfect collection of humming-birds, would do well to visit that made by Mr. Gould, at the British Museum. It embraces several hundreds of specimens, and is undoubtedly the finest in existence. The arrangement is exceptionally good, and is not according to the usual formal method, the birds being displayed in a most natural and realistic manner.

⁂

Mr. Henry Irving's edition of 'Romeo and Juliet,' containing the full text of the acting version of the tragedy, is in its sixth thousand.

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Educational Publishers and the London School Board.

BY THE EDITOR.

WE doff our cap, make our best bow, and tender our sincerest thanks to Mrs. Westlake for the speech she made at a meeting of the London School Board on the 18th inst., anent the Requisition List. Understand us, please; we thank Mrs. Westlake, not for the insult she offered the publishers, nor for the aspersions which, in Miss Taylor's judgment, she cast on the great body of Metropolitan Board Teachers; neither do we feel particularly grateful to her (indeed, we rather pity her) for the ignorance she displayed; but we do thank her for the debate which her ill-starred speech provoked. In another part of our issue we give a full report of the proceedings of the last meeting of the Board, and we ask our readers to peruse that report most carefully.

In it allusion is constantly made by Mrs. Westlake, Mr. Morse, Dr. Gladstone, and Mr. Mark Wilks (we mention them in the order in which they spoke) to the interview which the sub-committee had with a deputation from the publishers. That deputation—appointed by the Board—consisted of representatives of the firms of Messrs. Longmans, Green, and Co., Messrs. Nelson and Sons, Messrs. Cassell, Petter, Galpin, and Co., and the writer of these lines. As no members of the Board, other than those on the sub-committee, seemed to be aware of the true nature of that interview, perhaps it will be advisable at the outset to give the publishers' version of it. To us who sat out the debate on Thursday last, it was painful to listen to the one-sided representations of it.

The Rev. T. Morse said—

'I attended a meeting of the sub-committee, at which the representatives of the publishers were present, and I believe that we convinced them that the course adopted by the Board was the right one.'

A statement more at variance with fact than this was never made, unless it be that Mr. Morse interprets our concurrence with the Board in strongly denouncing the abuses of which they complained certain publishers had been guilty, as having 'convinced' us. The greatest, and indeed the *only* point scored by the committee, was when Mrs. Fenwick-Miller, in a happily-worded speech, conceived in a spirit entirely different from the Wilkian-Westlake oratory, modestly urged that she thought her special love for and study of physiology rendered her a better judge of the books written on that subject than Board teachers.

Equally erroneous is Mrs. Westlake's statement that 'the deputation that came up before us had nothing to say.'

The fact is, we answered all their objections, so far as Mr. Mark Wilks would allow us. This gentleman, fortunately or unfortunately, is blessed with strong individuality, and has a knack, when any one differs from him, of, to use the language of the Rev. J. Coxhead in a discussion which preceded the one with which we are concerned, 'appealing to his own authority.' This means much; practically, that you are denied fair debate.

Dr. Gladstone's reply to Dr. Wainwright is a puzzle to us. The only explanation we can give of it is, that the Doctor must either have been deaf or attending to other matters and not have heard Mr. Longman's speech, or, having heard it, he must have forgotten its purport. Dr. Gladstone is reported to have said: 'When these publishers met us they never employed these arguments,' alluding to the remarks contained in the memorial. Mr. Longman, who spoke first on behalf of the publishers, *emphasized* 'these arguments,' viz., 'that the provisions set forth in the Education Code, and the interpretation of those provisions by Her Majesty's Inspectors of Schools, are sufficient to ensure the character of the books to be used'; indeed, they formed the basis not only of the speech he then made, but of the speeches he has made in the various committee and general meetings of the publishers. As an additional proof of this, it so happens that the very words of that part of the memorial are Mr. Longman's.

Mr. Wilks' opinion being but a reflex of Mrs. Westlake's, need not be dwelt upon. We pass over these two good people's uncalled-for insult to the publishing trade, to express our deep regret that the great body of teachers employed by the Board should be looked down upon by the Chairman of the School Management Committee as being 'unfit to be trusted'—the words we noted as they were spoken. With what exceptionally bad taste this attack comes from Mr. Mark Wilks, who himself, be it known to the world, is a trained elementary teacher, and whose son is, or recently was, an assistant in one of the Board's schools, we leave it to others to judge.

Having now given the publishers' view of their reception by the sub-Committee—*a view which is endorsed by every member of the deputation present at the interview*—we proceed to examine the reasons urged by the Board for the retention of their Requisition List.

And here we would quote the former part of the opening sentence of Mrs. Westlake's speech: 'It is well on this matter to speak out plainly.' If, in availing ourselves of this advice, she and her colleagues are hit rather hard, we promise them that the hitting shall, at least, have the merit of being fair.

The Board's reasons for retaining their Requisition List may be thus briefly summarized:—

1. That the Board, in the exercise of its functions as an important and responsible body, has a perfect right to buy and sell where it likes.

2. That teachers are not sufficiently 'cultured' (Mr. Wilks' own expression used to the deputation) to make the best selection of books.

3. That supposing the 'culture' of the teachers was on a par with that of Mr. Wilks and his colleagues (for that is really what it comes to), they are, as a body, 'unfit to be trusted,' owing to the readiness with which they accept bribes, etc., held out by the publishers.

4. That (we quote from Mrs. Westlake's speech) 'if we should open our Requisition List to the smaller publishers, the methods pursued by them would leave no chance for the more respectable firms, as only unfair means result in getting the books of other firms on to the Requisition List.'

5. That by the retention of the Requisition List, and the care exercised by the Committee, not only are the best books chosen, but no suitable ones are rejected.

We reply, under the *first* heading: This is a question of trade, which the recognised trade journals have answered for themselves. The *Publishers' Circular* (April, 1882) says:—

'Remembering that the School Board outlay is met by precepts to which the ratepayers, as represented by the vestries, have to yield instant obedience, it is difficult to see on what ground the Board can defend a monopoly which virtually excludes the London publishing firms from the supply of books for the Board schools. From the ratepayer's point of view the principle of an open supply at the discretion of the teachers and managers has the *primâ facie* recommendation that competition in the publishing trade is likely to result in the provision of the best works at the lowest prices, while on the broad ground of fair trading the Board is bound to show no favour.'

The *Bookseller*, March 1882, says:—

'There is an absolute unanimity of opinion that the Requisition List, as at present constituted, is a serious bar to the legitimate interests of the trade. It is a disturbing element in the economy of business, it checks enterprise, and is inimical to the cause of education itself.'

At last Thursday's meeting Mr. Spicer said:—

'The tendency of a requisition list so put together is to create a trade monopoly; around trade-monopoly corruption always clings.'

This question is now a public one, and as such it must be judged. In trying to substantiate the publishers' grievances, it will be impossible to avoid the mention of names; but as we are on friendly terms with every house in the trade, what we say cannot reasonably be attributed to private quarrel,—seeing there is none.

Mr. Wilks, in challenging criticism, contends that no monopoly has existed, nor has any favouritism been shown; that each book stands or falls on its own merits, and has fair-play. Then, if this be true, we should like to have explained to us the phenomenon of a young firm—it would be affectation to withhold the name now, Messrs. Isbister—young, at least, in so far as its school publishing department is concerned, with no long-established books to form the basis of an extensive business, commanding at one time an abnormal, and nearly always the largest share of the Board's patronage? This firm does *not* enjoy throughout the country the proud position which its account with the London Board would assign it—of issuing better books than any other house. If it did, its position on the List would prove an index to its

position in the country, and its accounts would be the largest there also.

The largest METROPOLITAN Elementary School Bookseller, who supplies the Voluntary Schools, where in nine cases out of ten the choice of books is left with the teacher, informs us that several firms do a larger trade with him than Messrs. Isbister do. This needs explanation; to put all the blame upon the poor teachers' shoulders is simply a miscarriage of justice. Will Mr. Wilks oblige us by referring to his file of the *Schoolmaster*? In the issue of that journal dated October 19th, 1878, he will find the following :—

'Some friends of the Rev. B. Waugh, formerly a member of the London School Board for the Greenwich division, have presented him with a cheque for 500 guineas, "as a mark of their appreciation of his work for neglected children, especially as a member of the first and second School Board for London, and as an expression of their sympathy with him in his present enforced retirement from public life." Mr. Waugh has been lately engaged in connection with the editing of the *Sunday Magazine* and in *producing school books for the house of Daldy, Isbister and Co.*'

Now, we hold we do not overstep the bounds of fair criticism when we inquire, not who these friends were, but whether or not Mr. Waugh was engaged in producing school books for the house of Messrs. Daldy, Isbister, and Co., during the time he was Chairman of the Books Committee, whose duty it was to select books for use in the Board schools?

If he were *not* engaged in this work during his connection with the Board—and we do not say that he was—does it not strike our readers as being a singular coincidence that he, and subsequently the Rev. J. A. Picton, at one time also an active member of the *Book Committee* of the Board, should join Messrs. Isbister and Co., whose transactions with the Board are so large? It is matter of common notoriety that this firm has for years engaged one or more London Board inspectors to prepare elementary school-publications. If these inspectors had been engaged in the production of only two or three books, no voice would have been raised; it is the long-continued connection which is objected to.

And for Mr. Mark Wilks, who is one of Mr. Picton's friends, to affect ignorance of these facts, and to ask us to believe in that ignorance, is to tax our credulity to a point that becomes ridiculously childish.

Mrs. Westlake referred indignantly in both her speech to the deputation and the one reported in our columns, to the practice—a perfectly fair and legitimate one—adopted by all respectable firms (though she and Dr. Gladstone denied it) of sending travellers round to schools with samples of new publications. Perhaps her wrath will wax still stronger when she hears that to-day Messrs. Isbister not only employ (to borrow a word from her own vocabulary) 'touters,' but that one of these 'touters' is actually the father of one of the members of the School Management Committee. Of the character of that member we cannot speak too highly; we simply state the fact to show Mrs. Westlake's ignorance.

We pass on to the second reason: that teachers are not fit intellectually to make the best selection of books.

Miss Taylor's answer is complete. She said :—

'We hear a great deal about experts in education. Is it not open to the plainest common-sense that three or four members of the sub-committee are not so well qualified to judge of the best books in teaching as the vast mass of head-teachers employed by us? If the head-teachers are not fit to judge upon these books, I challenge the chairman of the School-Management Committee to dismiss them from their places and to elect others in their stead.'

To assert that a few amateur educationists, for the majority of the Books Committee are nothing more (as we think this article will prove), are better, or as well fitted, as men and women who have devoted their lives to education in its most practical form, is not worth the trouble of a denial. But apart from their special training, consider for a moment the incentives the head-teachers have for choosing the very best tools; their professional status, their advancement in life, nay, their very means of livelihood, depend largely upon a wise selection being made. And yet we are blandly told by the Wilkian-Westlake compact, that teachers as a body are unfit to be trusted; in other words, that they will forego all that is dear in life for a paltry champagne supper, or a stall at a theatre. Evidently they have overshot the mark for once. Granted, for the sake of argument, that a teacher makes a bad selection of books; it needs no wiseacre to see that that would speedily work its own cure.

The *third* charge has been already met in the foregoing remarks. Speaking as an old teacher, and in the name of teachers, we characterise the remarks made by Mrs. Westlake as a gross libel on the honour of the great body of teachers. That cases of bribery here and there may occur we do not deny; but these are only the exceptions which prove the rule.

We ask careful attention to the *fourth* reason, the former part of which reads thus :

'if we should open our Requisition List to the smaller publishers, the methods pursued by them would leave no chance for the more respectable firms.'

The most complete reply possible to this statement is, that 'the more respectable firms' reject Mrs. Westlake's maternal solicitude about their interests, and have signed the memorial. These names have not appeared in print before, and a perusal of them will show the unanimity that prevails in the trade. The odd exception or two only strengthens our position. Nearly every house which issues *elementary school publications* is represented, and we challenge Mrs. Westlake to name, in common justice to the firms who signed the memorial, the publishers,

small or great, who have been guilty of reprehensible practices.

There is no misgiving about her statements; she speaks with the authority of knowledge. Listen:—'One firm sent out theatre-tickets to teachers; another firm invited teachers to champagne suppers. Another case was far more serious—that of a publishing firm lending money to teachers, and another by backing their bills.'

Surely no woman would be so rash and indiscreet as to make these serious charges without good foundation. But what has Mr. Wilks, who seems to have changed his mind since the deputation waited on him, to say on this question?

'With reference to the question put as to why the name of the publisher who had given the champagne supper had not been removed from the List, seeing that the fact was known to the Committee three months, the explanation is that it has been difficult to verify the statement. *I have heard of it in the way of trade.*'

(The italics are ours.) Were there ever weaker arguments put forth in defence of the conduct of a public body than this? If Mr. Wilks' statement is true, what shall we say of Mrs. Westlake's conduct? This matter cannot be allowed to rest here. In the name of the publishers of London, we demand that these gross charges be at once substantiated or withdrawn.

In reply to Dr. Gladstone, we would respectfully inform him that it is a most *unusual* thing for an educational house to indulge in the festivities of which he speaks; and we put it to him, which firms are the most likely to have bribed—those who signed the memorial, or those who did not?

But what does Mrs. Westlake mean in the closing part of the sentence we just quoted as the fourth reason?

'only unfair means result in getting the books of other firms on the Requisition List.'

If such a thing is POSSIBLE, that unfair means *do* result in getting books on the Requisition List, there is an end of the whole matter, and the sooner the Requisition List is swept away the better.

Of the *fifth*, and last reason, we shall have no difficulty in disposing. Without even leaving the meeting in question, we propose to show that Mr. Wilks cuts the ground from under his own feet. The Rev. G. M. Murphy said at the meeting:

'while in a school in Finsbury some time ago, I found a book which I was told had been written by one of Her Majesty's Inspectors for that division. A more UNSUITABLE book for our schools could not be found.'

Here we actually have a case where a book is considered by a prominent member of the Board so unsuitable for school use, that he publicly calls attention to it. In reply to Dr. Wainwright, Mr. Wilks said:

'That is quite a matter of opinion as to whether the book is unsuitable or not.'

He virtually, however, acknowledges that the book is not a fit one, else why should he subsequently announce 'that the book is to be removed from the List by order of the Committee?'

That the best books are not always selected is, therefore, from this case, brought up not by an outsider, but by one of the members, quite clear. The evidence that books which fulfil the requirements of the Code in every respect are rejected, is overwhelming. Let us take two recent instances, where the firms mentioned shall be of such high standing that every work bearing their imprint carries a recommendation with it. The Board has declined Messrs. Nelsons' Geographical Readers, and Messrs. W. and A. K. Johnston's series of Schoolroom Maps. Now, we challenge the School Management Committee to prove that these publications are not 'suitable.' Of their excellence and exact adaptability to elementary school work there cannot be two opinions among competent critics. They have met with the heartiest approval of inspectors all over the country, which assertion brings us to the following most important part of Dr. Gladstone's speech:—

'Dr. Wainwright says that we have not answered the remarks of the Publishers' letter in our proposed reply. When these Publishers met us they never employed these arguments.'

To this assertion we have replied. But now comes a revelation of a lack of knowledge of the real facts of the case that few people would have credited the Chairman of the Book Committee of the London School Board with:—

'I believe that Her Majesty's Inspectors are entirely forbidden to approve any particular book, and are required to approve only the particular method of teaching.'

If the Doctor will refer to his copy of the New Code he will find on p. 115 the 'Standards of Examinations' set forth. The first footnote on the first subject reads thus:—

'Reading after Standard I will be held to include intelligence and fluency increasing with each Standard. It will be tested in the ordinary class-books, *if approved by the Inspector;* but these books must be of reasonable length and difficulty, and unmarked.'

So that, as every tyro in teaching knows, the reading-books he uses *must be approved by Her Majesty's Inspector.* But what Her Majesty's Inspectors are expressly *forbidden* to do is to interfere with the *methods* of teaching. It is an open secret that not long ago an inspector who meddled with the 'methods of teaching' in a certain school was taken to task by the Department. It is not an inspector's duty to prescribe methods; his office is, to test results.

But we desire to draw special attention to Mrs. Westlake's statement. Personally we would let the whole question hinge on this lady's testimony, it is so conclusive. Hear her:—

'I share sympathy with my colleague, Mr. Morse. He and I were asked to look over the reading-books sent to the Board, and we took great pains to examine them. We devoted months to the reading of these books, and I must say that I rose from their perusal a wiser and a sadder woman.'

She then proceeds to characterize bad books, books that had evidently been rejected :—

'There was in many cases no end and no beginning—subjects dealing with a wide range without any connecting link, and the result is that children get odds and ends of knowledge without any system of connection.'

Precisely so ; but will Mrs. Westlake go a step further and name the reading-books which she and her colleague approved and placed on the List that do not answer to the above description ? Her remarks apply to every set of readers issued, if we except the odd consecutive series here and there, which, relatively speaking, have no sale.

It may be asked, what do publishers want? We believe Mr. Spicer exactly represented the feelings of the trade when he said : 'I would not take all the books, but all those that come up to the full standard.' What publishers seek is fair play all round, and no favour ; that the Board do not create a code within a code, and reject books that fulfil the requirements of the Education Department, and that any inspector in the country would approve ; that when a teacher requisitions a work on the List and does not overstep the average limit, it shall be supplied ; that the Board's Inspectors shall be prohibited from writing *school-publications*, or if they write them it must be on the distinct understanding that they cannot be adopted by the Board.

In conclusion, we contend that we have shown that the Requisition List tends to create a monopoly inimical alike to trade enterprise and to the interests of education ; that its retention neither secures the adoption of the best books, nor the rejection of the worst ; that teachers are, as a body, as fit, intellectually and morally, to be trusted as any class represented by the members of the School Management Committee, and that their List is a needless restriction upon the practical educative work of the Board.

The School Board for London and the London Publishers.

18th May, 1882.

The School Management Committee presented a Report as follows :—

24. On the 30th of March the Board referred to the School Management Committee, for consideration and report, the following letter from forty-three publishers or firms of publishers :—

'Pilgrim Street, Ludgate Hill, London, E.C.,
March 25th, 1882.

'TO THE CHAIRMAN AND MEMBERS OF THE LONDON SCHOOL BOARD.

'SIR, LADIES AND GENTLEMEN,—

'For a long time past there has been a feeling of dissatisfaction at the effect produced by the operation of the Requisition List of the London School Board upon the publishing trade. The result of this list has been of a character to limit the use of books to a selected number, instead of throwing the choice open to al which fulfil the requirements of the Code.

'We should esteem it a favour if you would take into consideration the question whether it is necessary to the efficien carrying out of the work of your Board that this Requisition List should be retained.

'We would venture to suggest that the provisions set forth in the Education Code and the interpretations of those provisions by Her Majesty's Inspectors of Schools are sufficient to insure the character of the books to be used, and that teachers should be allowed the right of selection within the limits of the aforesaid provisions.

'We believe that the greater freedom advocated by us would be found beneficial to the true interests of education.'

Longmans, Green and Co.
T. Nelson and Sons.
Cassell, Petter, Galpin and Co.
Griffith and Farran.
W. and A. K. Johnston.
W. Swan Sonnenschein and Co.
W. and R. Chambers.
John Heywood.
Allman and Son.
J. Blackwood and Co.
Thomas Laurie.
John Marshall and Son.
Moffatt and Paige.
W. Stewart and Co.
Oliver and Boyd.
Charles Akrill.
J. H. Houghton.
G. Philip and Son.
Thomas Murby.
R. J. Derfel.
Sampson Low and Co.
Bean and Son.
Midland Educational Co. (Limited).
North Western Educational Co. (Limited).
North of England School Fur. Co. (Limited).
Charles Griffin and Co.
W. H. Allen and Co.
W. Binns.
Educational Supply Association.
A. Brown and Son.
J. B. Ledsham.
Gall and Inglis.
Strahan and Co.
Kegan Paul, Trench and Co.
Cameron and Ferguson.
G. Routledge and Sons.
Ward, Lock and Co.
Houlston and Sons.
Hodder and Stoughton.
W. Kent and Son.
Bemrose and Sons.
Crosby Lockwood and Co.
Joseph Hughes.

The School Management Committee referred this letter to the Store Sub-Committee for consideration; and that Sub-Committee have had an interview with the representatives of three of the firms who signed the letter. The School Management Committee, having considered their Sub-Committee's report, recommend that a reply be forwarded to the Secretary of the Publishers, stating that after an interview with the representatives of some of the firms, the Board have fully considered the matter, and see no reason for altering their present practice.

MR. MARK WILKS (Chairman of the School Management Committee) moved :—

24. 'That, in accordance with the recommendation of the report, a letter be forwarded to the Secretary of the forty-three publishers, or firms of publishers, in reply to their letter respecting the Board's Requisition List, and the limit of selection allowed teachers.'

An amendment thereon was moved by Mr. Sydney Buxton, and seconded by Mr. Richardson :—'That the proposed resolution be referred back to the School Management Committee with instructions to bring up a draft reply for the consideration of the Board.'

Mr. BUXTON said : I believe our requisition list is quite satisfactory, and I do not think it would be well to send a letter like this ; but rather, having considered the matter, that we should send a civil reply explaining our position, and stating that we do not propose to take any further action. I believe

there was one drawn originally to that effect before this proposed reply was agreed upon. I know there has been a considerable amount of dissatisfaction about the way in which our requisition list has been carried out.

Mr. G. B. RICHARDSON: I want to know what Mr. Sydney Buxton means by 'our position'—I do not know what it means. To me it seems to be wrong that we should absolutely exclude any books from the list which publishers issue. Why should we shut up our list against any of them?

The Rev. THOMAS MORSE: I attended a meeting of the sub-committee at which the representatives of the publishers were present, and the matter was very fully discussed there, and I believe that we convinced them that the course adopted by the Board was the right one. We told them the special reasons which existed, but they were not reasons which could be discussed openly at the Board. I think the Board might well be satisfied with the conclusion that was then come to. If Mr. Buxton had been a member of our Committee I think he would have been satisfied with the letter which it is proposed to address, and that it is quite unnecessary to make any change.

Mrs. WESTLAKE: It is well, on this matter, to speak out plainly, and to say that we consider our requisition list ought not to be open to all publishers. You are aware of what there has been going on. You are probably aware that there has been a multitude of little school books issued purporting to answer the requirements of the Code, which supply but a small modicum of knowledge. These little books are issued in shoals by the various publishers, especially by those firms of small and struggling publishers who wish to make a name and a fortune. The large firms, as a rule, do not issue many of these books, which are issued by thousands, and offered upon pressure to the School Management Committee. What are the means adopted by these firms? An enormous amount of touting must be done. Those members of the Board who go to the schools and come in contact with the teachers discover how these touters call at the schools and leave books there. For that reason, a rule had to be made to keep the doors closed against these touters, but this was of but small importance compared with other practices. One firm sent out theatre tickets to teachers; another firm invited teachers to champagne suppers. Another case was far more serious—that of a publishing firm lending money to teachers, and another by backing their bills. I need not say that this is a very insidious way of pushing business, and it is not surprising that some people cannot resist the temptation to use the books and the apparatus published by these firms. We must keep our teachers free from such temptation. I must mention the fact that the great firms do not practise such means. They send their wares into the open market, and try to sell them by legitimate methods; but if we should open our requisition list to the smaller publishers, the methods pursued by them would leave no chance for the more respectable firms, as only unfair means result in getting the books of other firms on to the requisition list; and it certainly follows that the books of these unfair dealers are not likely to be the best. In fact, the Stores Committee almost came to the conclusion that, instead of opening its list to a greater number of books, it ought, on the contrary, to further restrict that list, and to settle itself what books shall be used in the schools. At the present time the requisition list is very broad, and really does allow very great choice, to meet a teacher's notion of the method of instruction most suitable in their respective cases. It is a fact, that publishers look upon the London School Board as a great advertising medium. The books we adopt are chosen by copy of example by many of the Provincial School Boards, and on that account we should be very careful as to what we admit. I share sympathy with my colleague, Mr. Morse. He and I were asked to look over the reading books sent to the Board, and we took great pains to examine them. We devoted months to the reading of these books, and I must say that I rose from their perusal a wiser and a sadder woman. In many cases, the subjects had no connection the one with the other; each seemed to hang on its own hook as it were. There was, in many cases, no end and no beginning—subjects dealing with a wide range without any connecting link, and the result is that children get odds and ends of knowledge without any system of connection. I think we are bound to say that our books should be systematic, and capable of meeting the wants of children to the full extent of their several standards. The deputation that came up before us had nothing to say in answer to our objections. The large firms seemed to be perfectly satisfied with our present plan.

Dr. WAINWRIGHT, quoting the terms of the proposed letter, said: This is not an argument, but dictation; this is the language of the proposed document; the Committee omit to say what is advanced on the other side.

Miss TAYLOR here rose and complained of some members holding conversation, and stated that the Chairman had insisted upon complete silence being maintained while the terms of the Report were being advanced.

The CHAIRMAN: That is very strong language, Miss Taylor.

Miss TAYLOR: It is, Sir.

Miss TAYLOR then rose and said: I should have been disposed to accede to the recommendation of the School Management Committee but for the reasons given; and, in the name of all the teachers of London, I do protest against the aspersions cast upon them. We have heard that two or three members of the Sub-committee, or the whole Committee, who dispense the patronage of this Board, can do so with credit, while teachers are supposed to be guilty of actions which are not to be criticised. I challenge the Board to say or to name, any teacher under this Board who has been guilty of the practices referred to. I make this challenge in their name, because it is not in their power to answer the accusation at this Board. Head-teachers under this Board include many honourable men and teetotallers, who are not amenable to the temptation of a champagne supper, and they include women as well as men, women head-teachers as well as male head-teachers, who also have the selection of books from the requisition list. I challenge any one to say that any lady teachers accepted any champagne suppers. I deny that they have done so. I think that if champagne suppers were in question, two or three members of the Sub-committee would be more easily bribed than all the teachers of London. Then we are told that one or two publishers lent money to the head-teachers—we heard that a fortnight ago. On that occasion I moved that our assistants should be paid their salaries in a direct manner from the Board itself, instead of through the head-teachers. The CHAIRMAN of the School Management Committee, then boiled over in righteous indignation at its being supposed that more than one teacher was in the habit of borrowing money. He sits quietly enough now when his own colleagues are in question, and when it is said that the teachers borrow money in such numbers as to degrade their calling. I would not sit quietly in his position while hearing that such things were done by the teachers of the Board. On the other hand the question arises as to the variety of our teaching from the books used by us. I do not, and many of us do not, approve of the degree of centralization which has been carried on under this Board. If the servants of all the public bodies were to be governed in this way, where would be the room for originality and variety of talent? What suits one teacher will not suit another. A man or a woman of special genius ought to have some latitude given for his or her method of teaching. We hear a great deal about experts in education. Is it not open to the plainest commonsense that three or four members of the Sub-committee are not so well qualified to judge of the best books to use in teaching as the vast mass of head-teachers employed by us? If the head teachers are not fit to judge upon these books, I challenge the Chairman of the School Management Committee to dismiss them from their places, and to elect others in their stead. If our head-teachers are not honest enough to be trusted with the smallest amount of patronage in selecting books for their own schools, I trust now that the teachers will judge as it deserves the aspersion that has been cast upon them and the silence of the Chairman of the School Management Committee in this respect.

The Rev. J. R. DIGGLE: We have heard to-day a defence of the requisition list. I want to ask two very plain questions. The first is this: It was mentioned at the Board a short time ago that one of the publishers lent money to a master in a school who requisitioned for that publisher's books. I want to know that publisher's name, and whether it has been removed from the list. The second is this,—it has been within the knowledge of the Stores Committee that a certain publisher gave a champagne supper to a number of our teachers, and it has been insinuated that this was done with the object of securing patronage. The general inference is that those teachers should look favourably upon these publisher's books when they came to the requisitions. I ask whether that publisher's books are on the list to-day, and whether his name has been removed from the list. Grave suspicion rests on the Sub-committee. The constituents of those members will judge severely on what seems to be of a very demoralising character. I hope the question will be sent back to the Committee by a very large majority.

Dr. GLADSTONE (Chairman of the Stores Committee): Mr. Buxton says that we should write a letter to the publishers, stating our grievance. He does not say that we are doing wrong, but thinks it would be a more discreet and more cour-

teous matter to send a letter in accordance with his amendment, instead of the one now proposed by the Committee to be sent. When the letter of the publishers was first received by us it did seem that we should reply and give our reasons. We then thought it better to ask the publishers to come before the Committee. The representatives of three large firms came with the Secretary to meet us. Having conversed with them for some time, at a satisfactory interview, it was decided that it was unnecessary to write a letter of the kind suggested by Mr. Buxton, and the matter was then brought before the School Management Committee, which resulted in the recommendation now before the Board. I am of opinion that it would be better to give a reply in a courteous manner; and it was in that spirit that I had prepared a letter prior to the decision of the Committee being arrived at. I shall vote, therefore, on behalf of the Stores Committee, to accept the proposal of Mr. Buxton. Dr. Wainwright says that we have not answered the remarks of the publishers' letter in our proposed reply. When these publishers met us they never employed these arguments. I believe that Her Majesty's Inspectors are entirely forbidden to approve any particular book, and are required to approve only the particular methods of teaching. But the proposal of the publishers is that we should throw aside all our influence and control over the teaching in the schools by allowing the teachers to use any kind of book, as well as to employ any particular method. I would not do the one nor the other; for it is our duty not only to secure good teachers, but also good books and good apparatus, failing which we should neglect our duty to the children. We, nevertheless, wish the teachers to have the right of selection within limits which we have laid down. Miss Taylor has inquired whether three or four members of the Board can possibly be as capable of judging of the nature of the books as the teachers are. I have no hesitation in saying that there are some members of the Committee who have far more experience on these matters than all the head-teachers. Some of those members have a speciality for drawing, others for reading; and according to their particular talents the books are distributed amongst them for perusal before they are accepted or rejected. Mr. Diggle asked whether the publisher who offered money to some of our teachers has had his name removed from the list. That name has not been removed: but a member of the Committee has given notice of motion on the Business Paper for consideration of the case at the Committee-meeting to-morrow. Respecting the champagne supper, of which we knew something three months ago, I believe it is not an unusual thing. It is a case common in the trade, but we have good reason to question whether the head of the firm knew of this practice which was being carried out by one of their representatives.

The Rev. J. R. DIGGLE repeated his second question, asking whether a certain publisher, who had given a champagne supper with the intention of securing the recommendation of teachers for his books, had been struck off the list.

Mr. ROSS: I rise at once to oppose the attack made by Mrs. Westlake upon some of the small publishers. I venture to say that small publishers can serve the Board as well as large ones can, and I question whether small publishers would go to the expense of champagne suppers, which would pay the larger publishers much better, on account of the greater returns made in their trade. I think that we should encourage the small publishers, for I am of opinion that there is not a more respectable class of men in the metropolis.

The Rev. G. M. MURPHY: I have endeavoured to support the policy of the Board, but whether we are degenerating or not I do not know, but if such matters are possible that are hinted at, it is time a radical change were made. Mr. Diggle asked whether some publisher had lent money to teachers and backed bills for teachers. Dr. Gladstone's answer went only that it was possible. There is a more serious matter connected with this than the mere giving of a champagne supper. I do not look at it from the temperance point of view. I attended a meeting the other day at the Society of Arts, where many of our teachers were present, when it was stated that something like that now mentioned was carried on on a very large scale even within our schools. It is a sad thing for people having the care and education of children to be open to these charges. I should have thought that it was a matter that was impossible; and, if true, it is derogatory to their character, and a disgrace to the School Board for London. Unless these names are removed from the requisition list, the School Management Committee will fail in their duty, for the tempter is worse than the tempted, and I hope that the School Management Committee will deal with the matter strongly. It is an under-current of things that certainly ought to be frowned down upon by every honest man and every honest woman. I hope the School Management Committee will be able to repudiate this conduct on the part of the teachers. While in a school in Finsbury, some time ago, I found a book which I was told had been written by one of Her Majesty's Inspectors for that Division. A more unsuitable book for our schools could not be found.

MISS SIMCOX: I hope the Board and the Store Committee will not be persuaded to look upon this matter as a piece of patronage to be dispensed. Our object is to provide the best possible books for our schools. I do not think that publishers of the kind in question are likely to produce the best books; but at the same time it is quite possible that a good book may be published by publishers who are not respectable. I think we should not strike off a book which would be useful to the schools, on account of the character of the publisher. As a matter of retribution, it would be satisfactory to strike off all the books published by tradesmen of this class. I am of opinion that there is no business done in a more satisfactory manner than that which is done by the Stores Sub-committee, under Dr. Gladstone; we may trust that Sub-committee to select the books on their merits; for it would be disastrous to do anything which would interfere with the honourable work of that Committee.

The Hon. LYULPH STANLEY, M.P.: I think that the general feeling of the Board will be that it is not desirable to abandon the control and criticism of the books supplied to us, and that it would not be well to throw open the list to all publishers. As to one of the publishers, who is said to have lent money, that case I understand is coming before the Store-Committee to-morrow, when the publisher will attend the Committee. As to the other matter, the charge of bribing and treating teachers with champagne suppers (or it may be 'supper, for very often the 's' gets in), I understand that it was done by one of the travellers of a firm, and there is no evidence that it was with the cognizance of the firm. Our first duty is to make a selection of books, and to choose the best ones. Mr. Diggle shakes his head, but these matters are to some extent new to me, for I have not been able to attend this Committee regularly, on account of other duties. I agree with Miss Simcox that our first duty is to make our selection for educational purposes, and to choose the best books. I do not agree with Miss Simcox that the selection of one particular book is of such paramount importance over all other books that we need retain the name of its publisher on the list. However, I would suggest that we should give the publisher referred to the opportunity of parting with his representative, or of having his books struck off the list.

Mr. ROBERTS: I listened with astonishment to the half-hearted way in which Dr. Gladstone spoke of the firm who gave the champagne supper. I hope we shall hear from Dr. Gladstone that he is prepared earnestly and energetically to inquire into the whole of the circumstances, for there is nobody who, more than Dr. Gladstone, objects to such proceedings as we have heard of to-day. It was a great pleasure to listen to the speech of Mr. Murphy, and it is the spirit in which all the members of the Board should deal with a question of this kind. I hope the Chairman of the School Management Committee, and the Stores Committee, will inquire earnestly into the matter. I am sorry to learn that a knowledge of this champagne supper should have existed three months ago; it is hardly what should have been allowed to exist. I hope Dr. Gladstone is prepared to investigate the matter so that no wrong may be done to the publisher and none be suffered by us.

Mr. SPICER: I hope care will be taken, and that justice will be done on all sides. Stories have been floating about in the trade for some time past. This is a kind of danger in which we almost naturally stand with regard to this kind of work, and it is simply impossible to give up the control. I believe that there are some publishers who would delight in this system of bribery; but the tendency of a Requisition List so put together is to create a trade monopoly; around trade monopoly corruption always clings. I would urge upon the Board the importance of throwing open that requisition list even more broadly than it is now. I would not take all books, but all those that come up to the full standard. Then anything which appears of this kind should be published to the full extent, so as to show to teachers that it is a dangerous thing—a blunder as well as a crime.

Mr. WILKS in reply: Mr. Spicer's suggestion is followed up literally and actually. There is no book shut out which is thought suitable in our schools. There is no way of extending the list except by making it a catalogue of every school book published at the present time. What will you do between these two things? We consider every book sent in (that is to

say it is considered by some competent person), and if the book is suitable it is put on the list.

(Dr. WAINWRIGHT here asked that the Finsbury book might be spoken of.)

Mr. WILKS: That is quite a matter of opinion as to whether the book is unsuitable or not. Mr. Frater tells me that the book is to be removed from the list, by order of the Committee. I would urge the Board to look to the general principle, and not to go off to the consideration of a matter of detail. Mrs. Westlake did not appear to make any aspersions on the teachers. If persons are placed in temptation such as she referred to, some of them may fail, and therefore they—both men and women—ought to be protected against temptation. With reference to the question put as to why the name of the publisher who had given the champagne supper had not been removed from the list, seeing that the fact was known to the Committee three months ago, the explanation is, that it has been difficult to verify the statement. I have heard of it in the way of trade. There is a certain amount of festivity going on. I could not bring it before the School Management Committee, for I could not put my finger on the firm. Mr. Spicer is well experienced in the trade, but he could not put his finger on the firm. We made inquiries privately; but when it was decided, after receiving the memorial, as a deputation was coming, we thought fit to defer the inquiry until that deputation should have arrived, when we might put questions to them. We put our questions to the deputation: and they smiled, the Secretary stating that they knew nothing about it. With respect to Mr. Diggle's statement, he need not think that we are careless about the morality of the Board. To-morrow the matter will be before the Stores Committee. I communicated with the publisher in question; and he, at his own wish, will attend the Sub-Committee to-morrow.

Mr. ROSS: I ask the question whether the publisher who has been guilty of the transaction does not do the largest trade with the Board?

Mr. WILKS: No; he does a very small trade with the Board, as Dr. Gladstone will testify. Of the number of reading books used by the Board, the order going from the highest to the lowest, is almost determined by the degree of ease with which the reading books can be got through. The easiest book is ordered in the largest numbers.

Mr. DIGGLE: Is it a fact that only a fortnight ago the Committee were in possession of the name of the publisher who gave the champagne supper?

Mr. WILKS: No.

Mr. Sydney Buxton's amendment was then accepted; and it was accordingly referred to the Committee to prepare a draft answer to the memorial of the publishers, and to present it to the Board for approval.

Mother-Teachers.

BY JOSEPH HUGHES.

(*Reprinted from 'The Governess.'*)

PROBABLY many of our readers will be surprised when they see the title of this article—'Mother-Teachers.' We must be candid, and say outright that we approach this subject with pain—pain that any respectable *man*, never to mention that that man is addressed as *reverend*, could be found to submit a motion to the London School Board of the nature of that which the Rev. T. Morse advocated at a recent meeting of that body. This worthy gentleman is the new vicar of Christ Church, Newgate Street, and has been pleased to ask the Board not to appoint any married woman as a teacher 'within two years after she has given birth to a child'; and he also further prays that 'teachers be required to resign their appointments five months before an expected confinement.'

We should like to know upon what grounds Mr. Morse arrogates to himself the right to dismiss teachers under the conditions which he specifies.

So long as teachers, be they men or women, *are of blameless character, and do their school work efficiently*, we hold that it is an impertinence on the part of any one, to pry into their domestic life, to inquire whether they worship at church or chapel, or vote for the Tory squire or the Liberal tradesman. These are the common rights of a citizen, apart altogether from school life, and any curtailment of them is a violation of the first principles of true liberty.

We presume that the London School Board's primary aim, when engaging their staff, is to secure the highest intellectual training for their children, at a minimum cost.

On the latter part we need not dwell, as *that* end is gained by the employment of women. And who, we ask, is so fit to teach our daughters, and the little darlings so dear to our hearts, as a trained woman, with her wealth of sympathy, her untiring patience, and her innate love for little children? Certainly not man.

An unmarried lady may, and in thousands of cases does, make an excellent teacher, but no observant individual would dare to say that she would not make a still better teacher after she had experienced a mother's love for her own children. By becoming a mother her sympathy with the young—the pre-eminent qualification of a good teacher—is widened and deepened. Perhaps Mr. Morse objects to retain the teachers on physiological grounds. Fortunately for London teachers, there is a lady on the Board who has made this subject her special study. We allude to Mrs. Fenwick Miller, than whom there are few women living better able to give a just judgment on this subject. In her the teachers have a true friend. At a meeting held recently at Saffron Hill she spoke on behalf of the teachers, and also urged that if this motion were adopted it would injure our schools, 'both by removing a large proportion of the best teachers, by causing incessant changes of staff, by preventing clever girls from choosing teaching as the profession of their lives, and by taking away from the children precisely the teachers best qualified by their maternal experiences to manage and guide them.' Upon the moral aspect of this delicate question we do not care to linger. Surely Mr. Morse would not put a premium on the very worst kind of vice. It practically amounts to this, that if many of the married women are to retain their positions as teachers under the Board, they are (speaking figuratively) to shake hands with a woman who has thrown in her lot with the champion of infidelity, and whose publications most right-minded people consider a disgrace to her sex and her country. Why interfere with the laws of nature? Out upon such prudery! For a womanly *woman* we have the highest admiration, but for a womanly *man* we have—well, we had better not set down our opinion.

The grossest injustice would be done to our

fair friends who have just entered the profession, to those who are in it, and to those who have left it and may wish to return, if this monstrous motion were to find favour with the Board. In conclusion we will cull a chapter from a teacher's life, which has a significant bearing upon this most important question. Some years ago a lady who had been an elementary teacher married a professional man. For a long time all went well as the proverbial marriage bell. By-and-by, however, sickness came, and with it a reverse of fortune. The bread-winner was stricken down, and scarcely expected to live. Olive-branches had in the meantime sprung up quickly, and there had been but little chance of saving. What was the wife and mother to do? With a decision of character and a heroism worthy of her sex, she gave her husband most of the savings, and booked his passage to a kindlier clime. Bracing herself up for a supreme effort, she applied for and obtained a school under the London Board. She kept the home together, *buried a baby in her husband's absence*, and to-day, though her partner has returned with a fresh lease of life and is doing well, she is one of the most respected and successful teachers engaged by the Board. We honour a nature so heroic. And yet these are the women Mr. Morse and Mrs. Westlake—for this lady seconded the motion—seek to rid the Board of.

How many teachers are helping widowed mothers, sick sisters, and unfortunate relations, who would not only be deprived this blessed luxury, but would be thrown almost penniless on the world were this objectionable motion passed!

Surely the teacher's struggle in life is severe enough, without having it further embittered by the imposition of artificial and obnoxious restrictions.

Monthly Notes.

THE METROPOLITAN BOARD MISTRESSES ASSOCIATION.—The first general meeting of this Association was held on April 28th, at the Saffron Hill Board School. There was a large attendance, nearly 200 ladies being present. Mrs. Hayter took the chair and called upon Mrs. Fenwick Miller, M.L.S.B., to move the first resolution, which was as follows:—

'That this Association of Metropolitan Board Mistresses (head and assistant) is formed for the purpose of mutual advice and support, and is open to single as well as married mistresses.'

Mrs. Fenwick Miller said that the circumstances which had led the women teachers of London to see the desirability of forming an Association which should be to gather up facts and represent them as might be needed, was the following resolution of the School Management Committee:—

'No married woman shall be appointed as teacher who has given birth to a child within two years from the time at which such appointment is under consideration. After the 1st of January, 1882, any mistress in the service of the Board shall vacate her appointment within five months from the probable date of an expected confinement.'

This proposition was moved on the Committee by the Rev. T. Morse, and seconded by Mrs. Westlake. The Board, however, rejected the proposal by nineteen votes against fourteen. Such a proposition had been made several times before, and, in view of the possibility of its renewal in the future, some of the married mistresses had met together to consider what steps they might take, and from this beginning the Association had grown so rapidly, that they might hope it would be of the greatest aid to women teachers, in many ways, in time to come. She believed that it would be a grave mischief to the schools if such a proposition were ever carried into effect. She contested the statement that women about to have children were *ipso facto* unable to work, and gave instances from her own medical practice, of the great differences shown in the capacity of women, in different ranks and habits, to overcome the fatigue at such times. She denied, however, that the Board had any right, moral or economical, to go behind the results obtained by a teacher, to inquire into the teacher's state of health and domestic affairs. If the school were in a bad condition, it was the duty of the Board to dismiss the responsible teacher; but, if in good condition, the Board had no business with whether the teachers had headache, or gout, or children. The schools must suffer from the removal of married teachers.

Mrs. Legge seconded the resolution, which was carried unanimously. A resolution naming the officers for the ensuing year, and giving the committee authority to add six unmarried mistresses to their numbers, was moved by Miss Helen Taylor, seconded by Mrs. Usherwood, and carried. Votes of thanks to Mrs. Fenwick Miller and Miss Helen Taylor were proposed by Mrs. Curtis and carried very heartily, after which the meeting broke up. Any particulars respecting the Association may be obtained from Mrs. Usherwood, Thomas Street Board School, Limehouse.

THE HIGHER EDUCATION OF WOMEN.—IT has long been a grievance with female students at our universities that they have in most cases no means of showing the honours they have obtained, except by a lengthy and unsatisfactory title, such as 'First Class Honours, Higher Local,' or 'Second Class History Tripos, Cambridge.' We have great pleasure, therefore, in drawing attention to the fact, which will be doubtless new to many of our readers, that the University of St. Andrews, N.B., grants—and has done so since 1877—the degree L.L.A. (which we presume means Lady Licentiate in Arts) to those of its female students who satisfy the Examiner in a certain course of subjects. This is, we are convinced, a move in the right direction, and we only hope that other universities will follow the example of their northern sister.

The following items of interest are taken from the Syllabus, to which we must refer those of our readers who desire further information on any point:—

1. There is no limit as to age in the L.L.A. Examination.
2. After 1883 no Candidate will be admitted to the St. Andrew's L.L.A. Examination who does not hold the Local Examination Certificate of a University. Those, however, who have entered for Examination in or before the year 1883, but have not obtained the title, may complete their Examination in any subsequent year.
3. The present centres for Examination are *St. Andrews, Edinburgh, Aberdeen, London, Halifax, Bristol, and Belfast.* The next Examination will be held on the 16th, 17th, 18th, and 19th of April, 1883; and those who intend to become Candidates (whether they have passed in any subjects previously or not) are requested to intimate the fact to *Professor Knight, the University, St. Andrews*, not later than the *1st of March*, 1883. Thereafter, a 'Form' of application will be sent to them to be filled up, signed, and returned to Professor Knight not later *than the 15th of March*, 1883.
4. In each subject there is a Pass and an Honour Standard.

The subjects mentioned in the prospectus are English Language and Literature; French; German; Italian; Latin; Greek; Mathematics; Natural Philosophy; Chemistry; Mineralogy; Physiology; Botany; Zoology; Geology; Physical Geography, and Palæontology; Logic and Metaphysics; Moral Philosophy; Education; Politi-

cal Economy; Comparative Philology; History; Theology; Biblical Criticism; Church History; and Hebrew.

5. Any Candidate who passes in five subjects (one at least being a language), or who gains honours in one subject, and passes in other three (one of the four being a language), will receive the title of L.L.A. English counts as a language in this Examination, if the Honours subjects are taken in it. To women who propose to become teachers, this title is equivalent to a diploma, or licence to teach, in the subjects in which they have passed, or taken honours. Candidates entered before 1883 are only required to pass in four subjects.

6. The standard of attainment both for Pass and Honours is the same as that required for the M.A. degree in the subjects included in the University curriculum,—the books prescribed, the questions set, and the hours of Examination, being identical; and in the subjects not at present included in the University curriculum, the standard required is analogous.

Since 1877 no less than 676 candidates have entered for these examinations. Of these 547 passed in one or more subjects, and 145 received the title of L.L.A.

UNIVERSITY OF LONDON.—The annual presentation of students for degrees at this University was held on the 10th May, at Burlington House, Piccadilly. Sir George Jessel, Vice-chancellor of the University, presided, in the absence of Earl Granville, who was unavoidably prevented from attending. After the distribution of the prizes and exhibitions to the graduates and under-gaaduates, amongst whom were several ladies, the Chairman said that this was the first time the diplomas and prizes of the university had been distributed by a graduate. He had been a member of the university for more than forty years, and during twenty years of that period he had had the honour of serving the university as a member of the senate. The progress of this university had been somewhat remarkable, for it continued to increase, so far as the number of graduates was concerned, and if it continued to increase in the same ratio, even their large hall would be insufficient to accommodate the number of pupils. The benefits of the university had been extended not only to the colonies and dependencies, where they had held examinations, but also in other ways—he referred to the admission of women to degrees. No experiment could have proved more successful. London had been the first university to introduce the sciences in the ordinary examinations for matriculation and degrees, and to introduce degrees for science. Their object was to make boys and girls good men and good women in every sense, morally, intellectually, and physically, and to secure to them a kind of knowledge that would be useful to them in after life. After a few words by Sir John Lubbock, the proceedings terminated.

Training Colleges.

GENERAL EXAMINATION, 1881.

SECOND YEAR.

FEMALE CANDIDATES.

Grammar and Composition.

Three hours allowed for this Paper.

Every Candidate *must* perform the exercise in Composition. Questions on *one only* of the three following pages may be answered.

Composition.

N.B.—This exercise must not extend beyond this page, but it may occupy all the blank space available.

Write in plain language an essay on *one* of the following—

Music; Pet animals; 'Knowledge is power'; Any well-known and exemplary female character.

GRAMMAR.

Three *bowshots* far
Paused the deep front of England's war,
And *rested* on their arms awhile
To close and rank *their* warlike file,
And *hold* high council, *if* that night,
Should view the strife, or dawning *light*.
O gay yet fearful to behold,
Flashing with steel, and rough with gold,
And bristled *o'er* with bills and spears,
With plumes and pennons waving fair,
Was that bright battle-front! for there
Rode England's king and peers.
And *who*, *that* saw *that* monarch *ride*,
His *kingdom* battled by his side,
Could then his direful doom *foretell?*
Fair was his seat in knightly selle (saddle),
And in his sprightly eye was set
Some spark of the Plantagenet.

SIR WALTER SCOTT.

1. Express the above passage in clear and simple prose.

2. Parse the words in italics, and analyse the first six, *or* the last six, lines.

3. Make a list from the above lines, of (*a*) nouns, and (*b*) adjectives, both formed from nouns;—and explain, when necessary, the method of formation.

4. What information can you give about the author?

As a swarm of bees in vintage time
About the wine-press *where* sweet must is poured,
Beat off, *return* as oft, with humming sound:
Or surging *waves* against a solid rock,
Though all to shivers *dashed*, th' assault anew,
Vain *battery!* and in froth and bubbles *end;*
So Satan, *whom* repulse upon repulse
Met ever, and to shameful silence *brought*,
Yet *gives* not *o'er*, though desp'rate of success,
And his vain *importunity* pursues.—MILTON.

1. Express the above passage in clear and simple prose.

2. Parse the words in italics; break up the passage into its component sentences, showing their relation to each other, and give a detailed analysis of the last four lines.

3. Explain, and give illustrations of, the difference between *similes* and *metaphors*. Which of these figures is employed in the above passage?

4. What information can you give about the author?

'*That* the dead are seen *no more*,' said Imlac, 'I will not undertake to maintain against the concurrent and unvaried testimony of all ages and of all nations. There is no *people*, rude or learned, among *whom* apparitions of the dead are not *related* and believed. This opinion, which prevails as far as human nature is diffused, *could* become universal *only* by its truth. Those *that* never heard of one another would not have agreed in a tale *which* nothing but *experience* can make credible. That *it* is doubted by single caviliers *can* very little weaken the general evidence; and some who deny it with their tongues *confess* it by their fears.'

DR. JOHNSON.

1. Express the above passage in clear and simple prose.

2. Parse the words in italics, and analyse from the beginning down to "truth," or from thence to end.

3. Make a list of words in the above which are *not* of Anglo-Saxon origin, and give their derivations.

4. What information can you give about the author? What peculiarities of his *character*, and of his *style*, may be illustrated by the above passage?

School Management.

Three hours allowed for this Paper.

The questions on School Registers, at the end, MUST NOT BE OMITTED BY ANY CANDIDATE. Not more than EIGHT questions may be answered.

1. What should be the staff of teachers for a school of 200 scholars? If you had two pupil teachers, one of whom was in her first, and the other in her third, year, what duties would you assign to them respectively? Make a complete Time Table for the work of the Fourth Standard.

2. Make a list of words which present exceptional difficulty in spelling. Show how you would group them together, and by what sort of exercises you would fix the true spelling on the memory of the learner.

3. What rules would you give to pupil teachers on the art of putting questions, and what form of questioning is likely to prove

most stimulating and useful to learners? How far do you think it desirable to encourage in your class the habit of mutual interrogation?

4. Give the dimensions of school and class-room adapted for 250 girls; and a list of the principal fittings and furniture required. Say whether you think it desirable to provide standing as well as sitting room for the scholars, and if so, why and when you would use it.

5. Give some rules for securing (*a*) clear articulation, and (*b*) expression, in reading. Say also whether you know of any other means, apart from ordinary school reading lessons, of promoting taste, thoughtfulness, and a fondness for reading.

6. What instructions would you give to a pupil teacher as to the best mode of conducting a writing lesson? Refer especially to (*a*) the use of the black-board, (*b*) the use of pencilled lines for tracing, and (*c*) the prompt detection and correction of mistakes.

7. Give a sketch, with an illustration, of a first explanatory lesson on Descending Reduction? Show also by what sort of oral or mental exercise it is well to prepare a class before giving such a lesson.

8. What is the use of learning 'English Grammar' in elementary schools? Explain by what other exercises than those in pure Grammar, you can enlarge the vocabulary of scholars, and help them to a knowledge of the formation, relations, and right use of words.

9. In teaching Geography, why is it necessary or desirable to 'begin at home?' Illustrate your answer by giving a sketch of a lesson on the geography, physical and topographical, of the place in which you have lived, and of the country in which it is situated.

10. What is the meaning of the word 'Science,' and what departments of science fall properly within the limits of an elementary school course? Is it possible to give truly scientific lessons without using hard or technical terms? Illustrate your answer by an example.

11. Suppose the following passage occurred in the reading lesson of a higher class, what words would you select for special explanation; how would you explain them; and what additional information would you introduce in order to make the whole passage fully intelligible to your scholars?—

'The most popular of all English poems has been the Puritan epic of the "Paradise Lost." Milton had been engaged during the Civil War in strife with Presbyterians, and with Royalists, pleading for civil and religious freedom, for freedom of social life, and freedom of the press. At a later time he became Latin Secretary to the Protector, in spite of the blindness which had been brought on by the intensity of his study. The Restoration found him of all living men the most hateful to the Royalists, for it was his "Defence of the English People" which had justified throughout Europe the execution of the king. Parliament ordered his book to be burned by the common hangman; he was for a time imprisoned, and even when released he had to live amidst threats of assassination from fanatical Cavaliers. To the ruin of his cause were added personal misfortunes, in the bankruptcy of the scrivener who held the bulk of his property, and in the Fire of London, which deprived him of much of what was left. As age drew on, he found himself reduced to comparative poverty, and driven to sell his library for subsistence.'

School Registers.

12. What particulars should be inserted in the Admission Register, and how often should names be removed from it? What is the value of a 'Summary,' and what statistics should it contain?

Give a specimen of a Class Attendance Register with ten names for one week, and show how each of these particulars should be marked and calculated:—(*a*) presence and absence; (*b*) school holiday; (*c*) leaving school before the expiration of two hours' secular instruction; (*d*) correction of previous mark; (*e*) percentage of absence for the week; (*f*) number of attendances; (*g*) average attendance.

British History.

Three hours allowed for this Paper.

No candidate is allowed to answer more than *eight* questions.

1. What parties divided the English nation at the death of Elizabeth? What expectations had each from her successor?

2. Describe the origin and progress of our Colonies in North America.

3. Trace the action of the successive Parliaments of Charles I., and state the provisions of the Petition of Rights.

4. What part did the Scotch take in the quarrel between Charles I. and the Parliamentarians?

5. State some of the measures taken by Cromwell for the government of Ireland.

6. At the Restoration, what great questions immediately occupied the attention of the Convention Parliament, and how were they settled?

7. Describe the First, and the Second, Declaration of Indulgence issued by James II., and state some of the effects of each.

8. What impediments to the Revolution of 1688 occurred in Ireland and in Scotland? And how were they met?

9. Name some important social events, with dates, that occurred in the Stuart Periods, and give a brief account of English life at that time.

10. What was the basis of the claim of the House of Hanover to the Throne of England? Trace the descent from James I. (of England) of the first Sovereign of that line.

11. Give an account of 'The Fifteen,' 'The Triple Alliance,' 'The Quadruple Alliance,' in the reign of George I.

12. Describe fully the circumstances of the conquest of Canada.

13. What celebrated authors and artists lived in the reign of George III.? Give some account of two of them.

14. Describe the careers of Warren Hastings and John Churchill, Duke of Marlborough.

15. Name the principal political and social changes made in the reign of William IV., and describe one of them.

Geography.

Three hours allowed for this Paper.

No candidate is permitted to answer more than *eight* questions; or draw more than one map.

1. The British Isles are farther north than Lower Canada, but the climate of the latter presents extremes of cold unknown in the former, and is drier and less windy. How do you account for the differences?

2. How are islands formed? Give examples. Explain very clearly what an atoll is, and how it is formed. Where are atolls found?

3. Describe briefly the main characteristics of Europe, as regards its physical features, climate, and animal and vegetable life.

4. Describe fully the boundaries, physical features, productions, population, and form of government of Cape Colony.

5. A person starts from Calcutta in a ship for Melbourne, and stops at every English possession in the Malay peninsula and on the island south of it. Where does he stop? Mention anything of interest he would see.

6. Draw a map of New Zealand, marking the different colonies, with their capitals, and the principal physical features of the coast line. *Or*, of the South and West of Australia, giving the same particulars.

7. Arcot, Nellore, Juggernaut, Hyderabad, Allahabad, Agra, Masulipatam, Delhi, Rajpootana, Hurdwar—Give the respective situations of the above as exactly as you can, and mention any objects or circumstances of interest connected with any of them.

8. What articles of food does England import from India, Newfoundland, Australia, and Canada respectively? and what articles are exported from England to those places? Tell what you know about the method of production of any one of them.

9. The Austrian Empire is a combination of several nationalities. Name them, with the places which they inhabit. What is the form of government in that Empire? Mention any peculiarity in the position of the sovereign.

10. Where are Bulgaria, Eastern Roumelia, Servia, Roumania, situated? Name their capitals, religions, and productions, and mention the empire of which they once formed a part, stating, if you can, when they were separated from it.

11. Name, in order, the *principal* rivers, openings, capes, on the coasts of Italy and France. Give the names and situations of their chief sea-ports, with their populations and chief objects of trade. Draw a map of either of those countries, showing the mountain and river systems, besides the particulars above required to be described.

12. Where are Varna, Astrakhan, Riga, Fribourg, The Hague, Königsberg, Dresden, Mayence, Leipsic, Corfu, Ivica, Palermo, Ravenna, Toulon, Lepanto? For what are they respectively remarkable?

13. Draw a map of the Baltic Sea, marking the countries on its shores, its openings, islands, rivers, and chief ports.

14. Draw a map of New Zealand, *or* British North America, *or* South Africa.

Arithmetic.

Two hours and a-half allowed for this Paper.

No candidate is permitted to answer more than *ten* questions. The *solution* must be given at such length as to be intelligible to the Examiner, otherwise the answer will be considered of no value.

1. Find the value of 10 tons 14 cwt. 1 qr. 4 lbs. at £17 14s. 8d. per ton.

2. What will be the cost of laying turf on a lawn 30 yds. 2 ft. 6 in. long, and 10 yards 1 ft. wide, at 2s. 3d. per square yard—two flower-beds, 10 ft. long by 8 ft. wide, not to be turfed?

3. I sell tea at two prices, one being 50 per cent. higher than the other. A customer ordering 1 cwt. of each kind, I sell him the 2 cwt. for £38 5s. 4d., cheapening the better tea 20 per cent., and the inferior tea 15 per cent. What are the ordinary prices of my two teas respectively?

4. Multiply 395·68 by 4·804:—from the product subtract 1525·95, and divide the remainder by 156·337.

5. I lent a friend a certain sum 28 years ago. He has just paid me £866 5s., that being the principal and simple interest on my loan to him at the rate of 3 per cent. for 10 years, and 3½ per cent. for the remaining ten years. What was the amount lent?

6. The diameter of the fore wheel of a bicycle is 4⅔ that of the hind wheel, and the former makes 352 revolutions in travelling a mile. How many revolutions does the hind wheel make in a mile? and what is the circumference of each wheel?

7. What would be the gross rental of an estate for which the owner received £744 18s., after a deduction of 6d. in the £ for income-tax, and 4½ per cent. on the remainder for collecting had been made?

8. A schoolmistress receives £58 a year guaranteed salary, and ⅓ of a Government grant, averaging £59 10s. Her salary is subsequently increased by 7½ per cent., and the Government grant rises 11½ per cent. What is, then, her income?

9. Find the average of the six following numbers:—$\frac{10}{1000}$, 8½, 15⅔, ·08, ·001, ·893.

10. Two persons buy respectively with the same sum of money into the 3 per Cents., and into the 3½ per Cents., and get the same amount of annual interest. The 3 per Cents. stand at 75; what do the 3½ per Cents. stand at?

11. The owner of $\frac{3}{17}$ of a ship sold $\frac{5}{11}$ of $\frac{2}{3}$ of his share for £12$\frac{4}{33}$; what would a share equivalent to $\frac{2\frac{1}{2}}{4\frac{1}{4}}$ of $\frac{3}{5}$ of the ship cost at the same rate?

12. If the 3 per Cents. are at 92¾, and the 4 per Cents. at 123¼, what must be the amount invested in each in order that the difference of income arising from the two investments may be one shilling?

13. What is meant by *discount?* Find the *true* discount on £1,336 11s. 3d., due at the end of 3½ years, at 5 per cent. per annum.

14. Find the compound interest for £120 for 3 years at 3½ per cent.

15. A invests £457 10s. at compound interest for 3 years at 4 per cent.; B invests £477 10s. at simple interest for the same time, at the same rate. How much more will one receive than the other?

Domestic Economy.

Three hours allowed for this Paper.

No candidate is permitted to answer more than *eight* questions.

1. What facilities are offered by the Government to small investors in order to enable them to save? Describe one of them fully.

2. What are building societies and co-operative stores? On what principles are they conducted, and what are their advantages and disadvantages?

3. English cookery among the poorer classes is generally considered wasteful. Give any examples you know in proof of this, and suggest any remedies that occur to you.

4. How would you conduct a cookery class? How can the dishes, when cooked, be most advantageously used?

5. What are the changes that food undergoes from the time it is eaten till it is absorbed in the system?

6. Name any filters you may be acquainted with for purifying water. Describe the one you think best, and state its cost.

7. What are the symptoms of measles, scarlet-fever, and small-pox? Describe the treatment in each case.

8. Describe the process of vaccination. On what grounds do some people object to the efficacy of vaccination?

9. Write notes of a lesson on the choice of a dwelling.

10. What is a penny-bank, and how should it be worked in connection with a school?

11. 'All disinfectants act chemically. They either decompose or they combine with the noxious substances, and produce new compounds, which, if not void of smell, are comparatively harmless in their action on the human body.'

Mention a few of those which are most efficacious and most easily accessible, and state the manner in which they should be used in cases of infection.

12. Describe the course of needlework and knitting exercises adapted for infants, and for Standards I., II., and III. Say how you would graduate your early lessons in hemming; and whether any diagram or other illustration shown to the whole class would be useful, in addition to individual help and guidance.

FIRST AND SECOND YEARS.

FEMALE CANDIDATES.

Dictation.

For the Examiner.

One passage is given for candidates of both years.

The passage should be read *once* distinctly, and then dictated *once*, in portions as marked.

If the room is large, and there is danger of your not being heard at its extremity, you may permit one of the officers of the college to stand half way down the room, and repeat the words after you, exactly as you give them out.

It is essential that there be no complaint on the part of the candidates that they could not hear or understand: you can prevent this only by clearness, accuracy, and audibility.

The contests of parties in England | had long been carried on | with a ferocity | unworthy of a civilized people. | Sir Robert Walpole | was the Minister | who gave to our Government | that character of lenity | which it has since generally preserved. | It was perfectly known to him | that many of his opponents | had dealings with the Pretender. | The lives of some were at his mercy. | He wanted | neither Whig nor Tory precedents | for using his advantage unsparingly. | But, with a clemency | to which posterity has never done justice, | he suffered himself to be thwarted, | vilified, | and at last overthrown, | by a party | which included many men | whose necks were in his power.

Mental Arithmetic.

Twenty minutes allowed for this Paper.

You are to enter the answer in the space left for it after each question. Nothing is to be written on this paper, except the particulars required in the above table, and the answers (which must be written in ink) to the questions on the other side. No erasures or alterations are permitted. They will be marked as errors.

1. (196 ÷ 14) × (31 — 24) =

2. Paid 3s. 8½d.; 7½d.; 5s. 10½d.; 7s. 3½d.: what had I left out of a guinea?

3. 880 articles at 9s. 11½d. each =

4. How many guineas in £672?

5. 320 dozen at 2¾d. each article =

6. Receiving £109 10s. a-year (365 days), and spending £54 15s.: what can I save per day?

7. Reduce 9s. 9d. to the decimal of £1.

8. How much is £15625 in shillings and pence?

9. 127½ ÷ 10½.

10. (½ + ¼ + ⅛) cwt. at £60 per cwt. =

11. Find L. C. M. of 9, 15, 25.

12. Gave 2½ lbs. tea at 2s. 6d. a lb. in exchange for 15 lbs. of sugar,—cost of sugar per lb. = ?

13. 11d. a day (omitting Sundays), how much per year (365 days)?

14. Simple interest on £500 14s. 7d. for two years at 4 per cent. per annum =

Alternative Paper.

1. (17 + 19) × (49 — 13) =
2. Paid 11½d., 6s. 1½d. and 2s. 6½d.: what was left out of half-a-guinea?
3. 360 articles at 19s. 11d. each =
4. How many guineas in £759?
5. 720 score at 1½d. for each article =
6. Receiving £54 15s. per year, and saving 1s. 6d. per day: what do I spend per year (365 days)?
7. Reduce 5s. 7½d. to the decimal of £1 =
8. How much, in cwts., &c., is ·5875 of a ton?
9. 28½ ÷ $\frac{1}{19}$ =
10. ($\frac{1}{4}$ + $\frac{1}{5}$ + $\frac{3}{19}$) of £1000 =
11. L. C. M. of 12 . 15 . 16 =
12. Gained 3s. 4d. on selling 5 lbs. of tea: sale of how many lbs. would gain £8 16s. 8d.?
13. £16 14s. 7d. per year (365 days): how much per day?
14. Simple interest on £380 2s. 7½d. for 1 year at 4 per cent. =

FIRST YEAR.

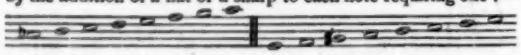
MALE AND FEMALE CANDIDATES.

Music.

Two hours allowed for this Paper.

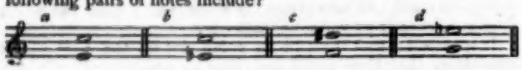
The Tonic Sol-fa questions are printed in Italic. Candidates must keep *entirely* to one set of questions or the other. *You are not permitted to answer more than* NINE *questions.*

1. Complete the following as scales of A flat (*La*) and E (*Mi*) by the addition of a flat or a sharp to each note requiring one :—

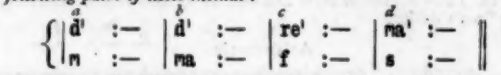


1. *Write an ascending and a descending minor scale, and mark the places of the tones and semitones.*

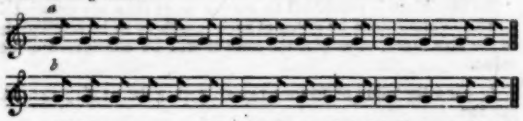
2. How many tones and semitones, or either, does each of the following pairs of notes include?



2. *How many tones and semitones, or either, does each of the following pairs of notes include?*



3. Group the following notes, so as to show *a* to be in $\frac{3}{4}$, and *b* to be in $\frac{6}{8}$ time :—

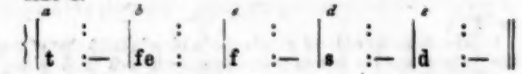


3. *Write two or more bars in three-pulse, four-pulse, and six-pulse measures, some bars to include rests. Give the time names to the notes so written.*

4. Add to *a* its major third; to *b* its perfect fifth; to *c* its major second; to *d* its pluperfect fourth (or tritone); and to *e* its minor seventh.

4. *Add to* a *its major third; to* b *its perfect fifth; to* c *its major second; to* d *its pluperfect fourth (or tritone); and to* e *its minor seventh.*

KEY C.



5. Write the following in $\frac{3}{2}$ time :—

(To be continued.)

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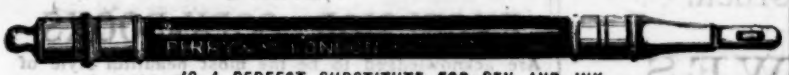

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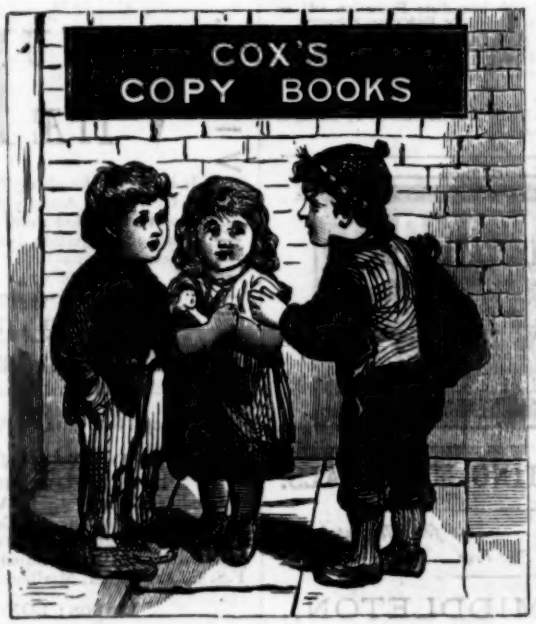

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